THE HEATING AND VENTILATING MAGAZINE

Vol. XI. No. 7.
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NEW YORK, JULY, 1914

Publication Office:
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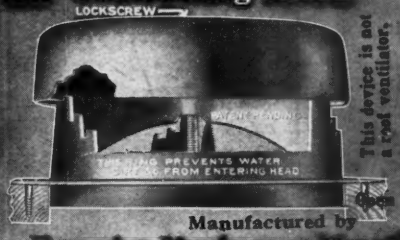

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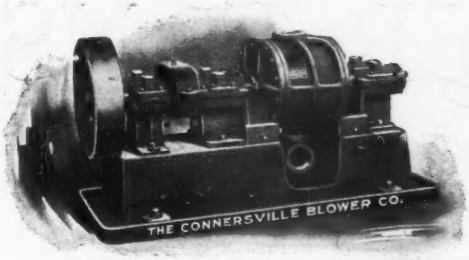

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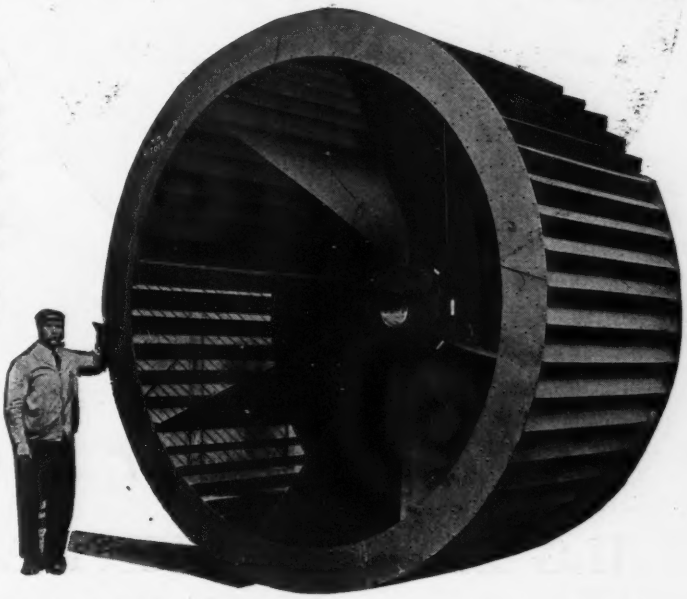

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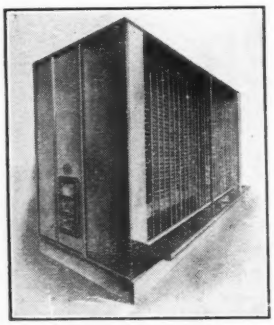

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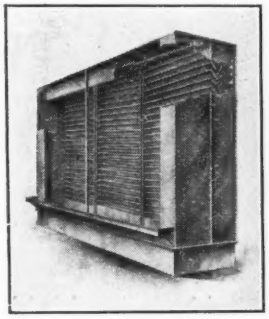

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NO ONE TYPE of apparatus is best suited for all kinds of service, but for each condition such as Air Cleansing, Air Cooling, Humidifying, etc., there is a type of Webster Air Conditioning Apparatus that is most effective for the specific service.

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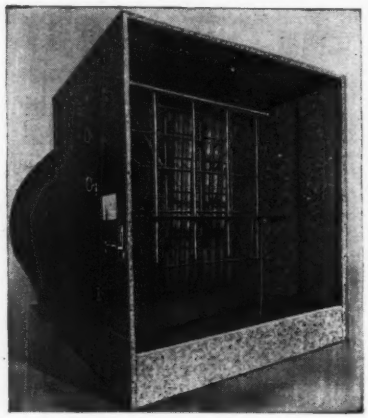

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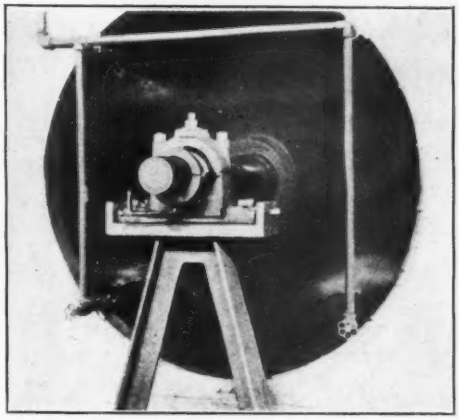

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1. Requires only as much space as an ordinary centrifugal fan of equal capacity.
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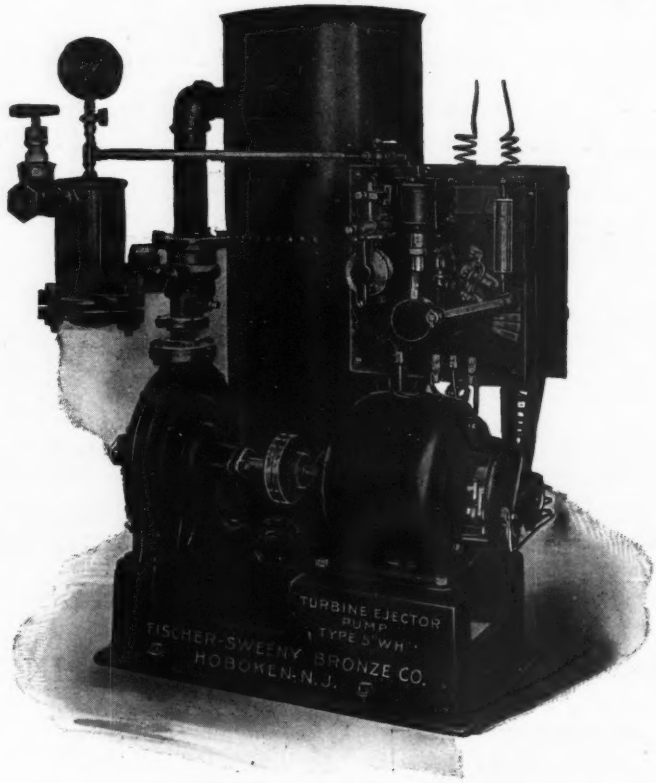
Type WH for Air Line Systems. Type W for Return Line Systems



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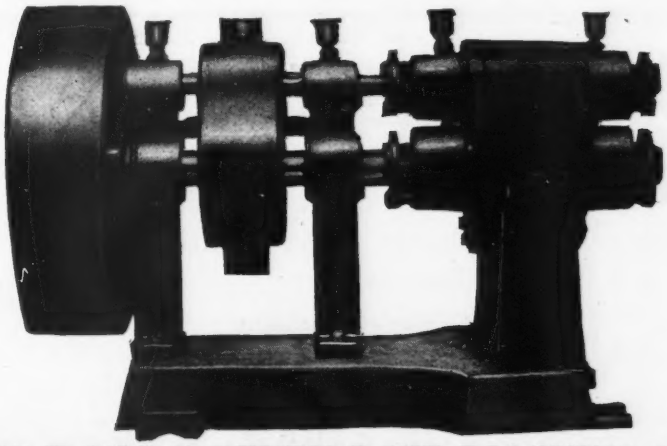

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These pumps are valveless, have no springs or cams; only two moving parts. Simplest pump on the market. Nothing to get out of order. Inside parts are not in contact; so no wear from friction, also less power required. Results are highest heating efficiency. This Return Line Pump removes the water and air and produces a partial vacuum in radiators. Result is steam filled radiators immediately. Does away with air pockets and cold sections of radiators. No foul air or damage from leaks from air valves, as this is a sealed system. Will pay for itself in short time in saving of fuel. We also manufacture the

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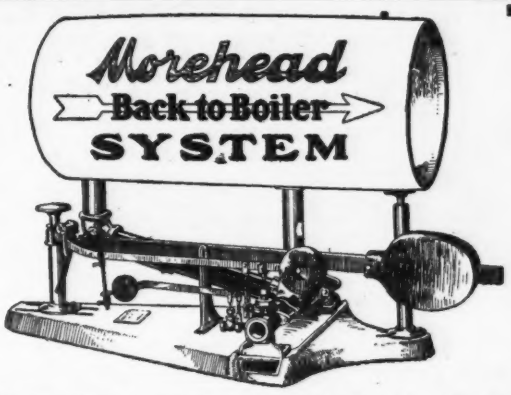

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But, feeding it back at a temperature of 300° or more and **without a pump** is **greater** economy. And that's the double service the Morehead Steam System performs. With the saving thus effected in fuel, time and repairs, do you wonder that this device has put a new meaning on economy in steam distribution? It is because Morehead Steam Traps are more reliable, have greater capacity and **are more economical** in the long run that our Catalog will interest you. For it explains in detail **why** they are better. Write for a copy.

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Will Not Leak Steam
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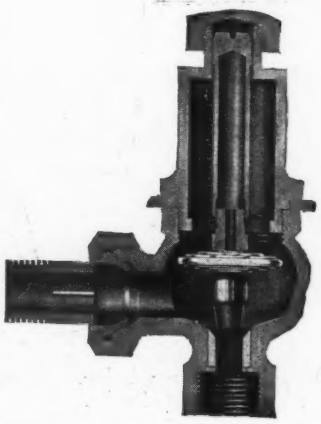

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WITHOUT LOSS OF STEAM

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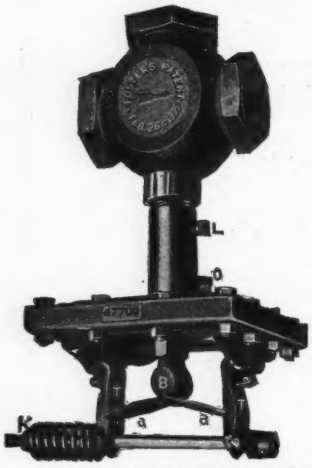

lead the way. Designed especially for steam heating, and suitable for vacuum systems, for delivery pressure of from 1 to 15 lbs.

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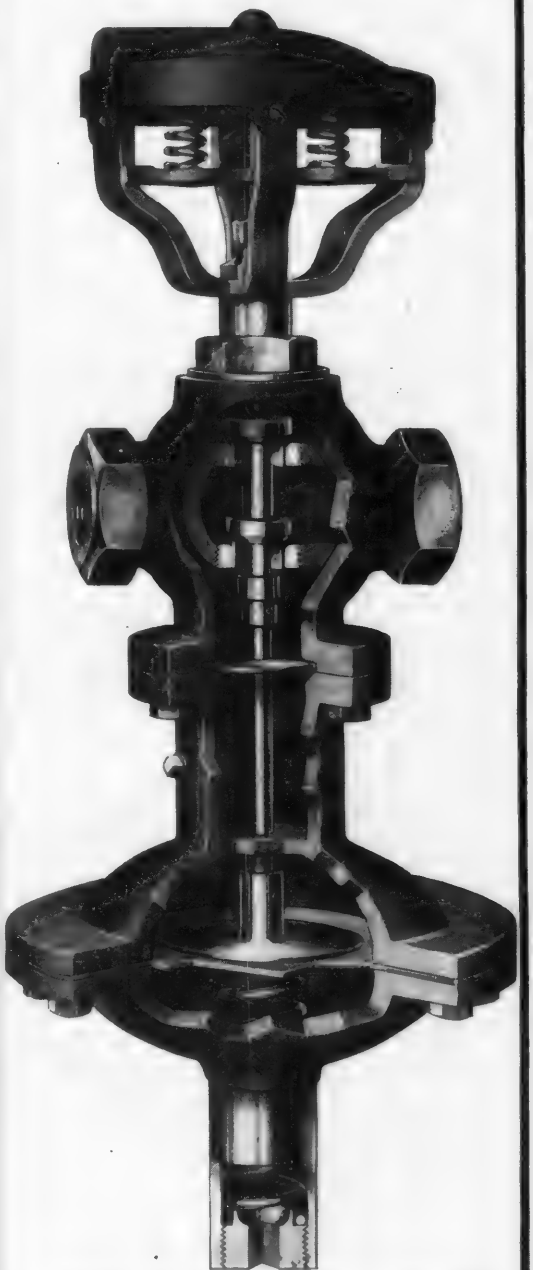

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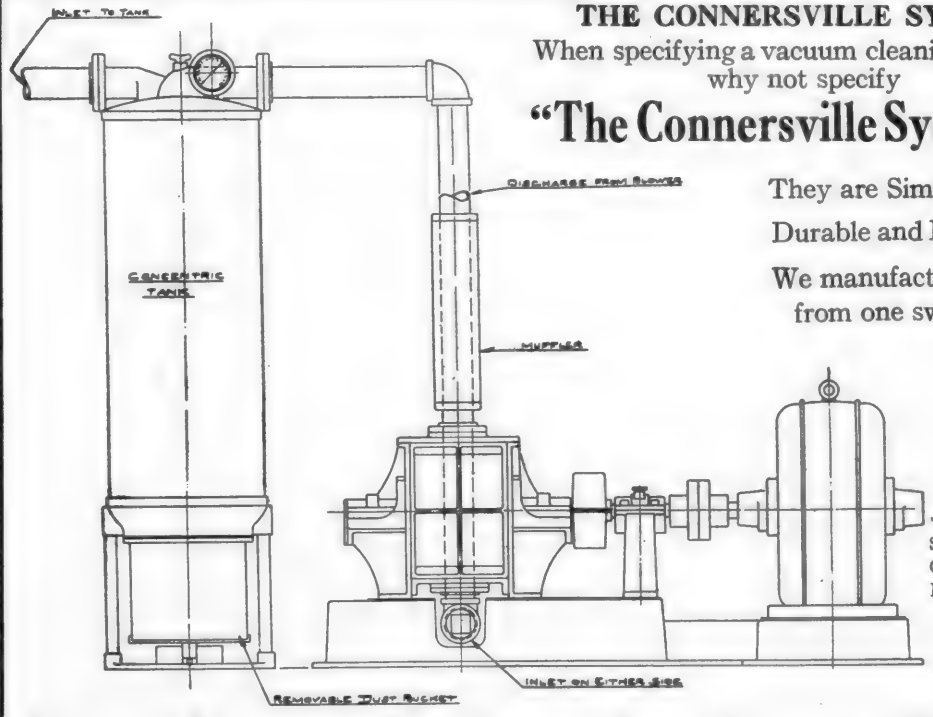

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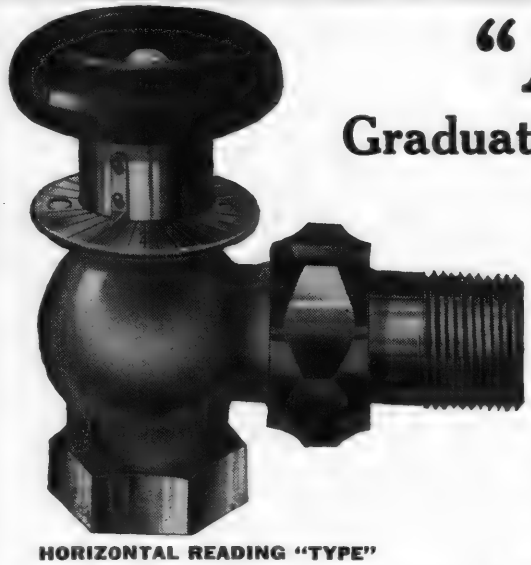

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The Heating and Ventilating Magazine

VOL. XI. No. 7

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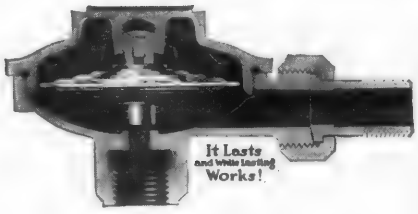

Have been the standard for a decade.

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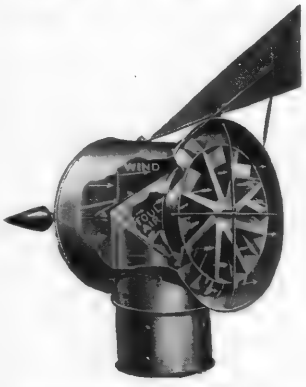

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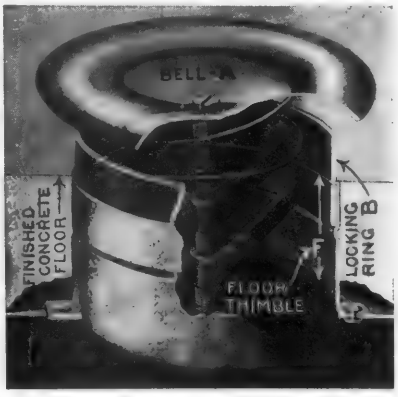

The Bi-Cal-Ky Mushroom Vent Cap and Floor Thimble Used in Floors with Fan System in Theatres, Schools, Churches and Public Buildings

is far superior to any other cap and thimble on the market in simplicity, appearance and efficiency, as well as low in price.

The BI-CAL-KY cap acts as a combination damper and diffuser and the screw as a support, adjusting rod and lock for the cap. The cap is raised or lowered by simply turning the screw. This increases or decreases the opening through which the air escapes, thereby insuring an equal distribution of air at the periphery of the cap.

Note projection of cap which deflects the air towards the floor, thereby eliminating draughts. Compare with other caps.

THE HEATING AND VENTILATING MAGAZINE

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The Recent Attack on Ozone

AN ANALYSIS OF THE JORDAN AND CARLSON LABORATORY TESTS.

BY J. C. OLSEN AND WILLIAM H. ULRICH.

(EDITOR'S NOTE—*The experiments described in the accompanying paper, which was presented at the Troy meeting of the American Institute of Chemical Engineers, were suggested by the much-discussed article by Jordan and Carlson, which was published in the Journal of the American Medical Association for September 27, 1913.*)

In spite of the fact that a great many investigations have been carried out in recent years on the effect of ozone on air bacteria and odors and also on the physiological effects of ozone, the most diverse conclusions have been reached and opinions expressed with reference to the questions investigated. This confusion where the questions at issue can be settled experimentally is due to both faulty scientific technique and logic, as well as very evident *ex parte* point of view and consequent bias of judgment. These conditions are well illustrated in two articles which were published in the issue of September 27, 1913, of the *Journal of the American Medical Association,* by Jordan and Carlson and Sawyer, Beckwith and Skolfield on the bactericidal, physiologic and deodorizing action of ozone. A number of errors in the methods used in the experiments given in these articles have been noted and these seem so serious, and the articles have been so widely quoted that it seems desirable to correct the misapprehensions which have been produced.

DETERMINING THE CONCENTRATION OF OZONE.

In the article by Jordan and Carlson, it is stated that the concentration of ozone is determined by drawing the ozonized air through a solution of potassium iodide which has been acidified with sulphuric acid. The liberated iodine is then titrated with thiosulphate solution. It is well known amongst chemists that an acidified solution of potassium iodide is readily oxidized by the ordinary oxygen of the air, and, therefore, if an acidified solution of potassium iodide is used for the determination of ozone, the results will be high. The amount of the error will vary with the concentration of the ozone and may easily give results double the true concentration of ozone. This error can easily be demonstrated by drawing air free from ozone through such an acidified solution of potassium iodide. It is evident, therefore, that no reliance can be placed on the figures given for the concentrations of ozone which are reported in this article. In the article by Sawyer, Beckwith and Skolfield, the concentrations of ozone were not determined.

It is universally recognized by ventilating engineers who are familiar with the use of ozone that it is of the greatest importance to regulate the concentration of the ozone and that ozone is useful only when employed in the proper concentration. This well-known principle seems

to have been so little understood by these investigators that they failed to make careful and accurate determinations of the concentrations of ozone used and, therefore, many of the conclusions which they reached are entirely vitiated.

EFFECT ON ODOROUS SUBSTANCES.

Another very serious error in experimental procedure is found in the tests which were made on the effect of ozone on odorous substances. A considerable number of such substances were experimented with and the conclusion was reached that the ozone *masks* these odors but does not destroy them and that, therefore, ozone is not useful in the removal of such odors.

The method of procedure consisted in exposing the substance giving off the odor until a marked odor was noticed in the small closed room which was used for the experiments. The ozone machine was then operated until a strong odor of ozone was produced. Observations were made from time to time of the odor in the room and it was observed in a good many cases that the ozone odor gradually disappeared and the odor of the substance experimented upon returned. In some cases ozone was again generated until its odor was pronounced and observations made with reference to the disappearance of the ozone odor and the reappearance of the odor of the substance experimented upon. The conclusion was drawn that the ozone did not destroy the substance giving the odor but masked it; this conclusion being based upon the disappearance of the ozone odor and the return of the other odor. No other evidence, whatever, on this point is presented.

In these experiments, no attempt seems to have been made to determine the amount of the odorous substances which were present in the air except by the odor. The experimenters apparently did not consider the fact that the odors of substances differ a great deal in intensity and that the quantities of substances which would be present, even though the intensity of the odor was the same, would differ very much. These authors also failed to keep in mind that the destruction of odors by ozone is an oxidizing process and that this, as well as all chemical reactions, are quantitative in the sense that a definite amount of oxygen is required to oxidize a definite amount of an oxidizable substance.

The following reaction takes place when ozone oxidizes hydrogen sulphide:

$$H_2S + O_3 = H_2O + S + O_2$$

That is, 34 parts of hydrogen sulphide would require 48 parts of ozone for its oxidation. When the hydrogen sulphide is dissolved in water, the sulphur liberated is still further oxidized by the ozone to sulphuric acid which would require a still larger quantity of ozone, but according to the reaction given, a somewhat larger amount of ozone than hydrogen sulphide would be necessary for the destruction of this substance. Now, if the intensity of the ozone odor is much greater than that of the odor of hydrogen sulphide, the hydrogen sulphide would be oxidized by the ozone in the experiments reported by Jordan and Carlson and some other authors quoted, and the hydrogen sulphide odor would then return as reported by these investigators.

EXPERIMENTS ON ODORS.

In order to verify these conclusions, experiments were carried out to ascertain the amount of hydrogen sulphide which will give a distinct odor. A large balloon flask of 30 liters capacity was used. The hydrogen sulphide was produced by treating known weights of carefully analyzed iron sulphide with dilute sulphuric acid. The reacting substances were placed on a watch crystal suspended in the center of the balloon flask. In addition to the odor, tests were made with lead acetate paper.

Intensity of odor of hydrogen sulphides:

mg. H_2S per cubic meter	Test with lead acetate paper	odor
977	very black	very strong
244	" "	strong
61	" "	distinct
30	turned black slowly	fairly distinct
15	brown on edges	faint
7.6	turned brown very slowly	no odor

While to obtain a distinct odor of hydrogen sulphite, 61 parts are required, the odor of ozone is very marked when present to the extent of one part per million; the limit being one-tenth part per million. In the experiments of Jordan and Carlson, the concentration of the

hydrogen sulphide must have been from 30 to 60 mg. One part of ozone would have given a strong odor which could mask the odor of the hydrogen sulphide until, by the oxidation of the latter, the ozone was decomposed. Less than one part per million of the hydrogen sulphide would be destroyed by this oxidation, leaving a sufficient amount of hydrogen sulphide to give a very distinct odor. On again generating ozone until a strong ozone odor was obtained, the hydrogen sulphide would be again "masked," and when the ozone odor had disappeared the hydrogen sulphide odor would reappear. This could be done repeatedly as reported by Jordan and Carlson. The conclusion, however, which they drew is entirely unjustified, namely, that their experiments showed that the hydrogen sulphide odor was merely masked and hydrogen sulphide not oxidized or destroyed by the ozone.

In order to verify this conclusion the following experiment was carried out. A concentration of 25 mg. of hydrogen sulphide was treated with ozone of a concentration of 35.6 mg. per liter. In these concentrations there would be just enough ozone to oxidize the hydrogen sulphide. In this experiment the ozone odor was at first very pronounced, but after this odor had disappeared, there was no hydrogen sulphide odor. A slight acidity was indicated by the reddening of blue litmus paper. The ozone used had been very carefully tested for nitrous oxides but none were found.

Another experiment was carried out in which the ozone concentration was 7.6 parts per million while the hydrogen sulphide concentration was 60.7 mg. per cubic meter, so that only a small part of the hydrogen sulphide could be oxidized by the ozone present. At first only the odor of the ozone could be detected. The hydrogen sulphide odor gradually returned so that within one hour a faint and, after two hours, a distinct hydrogen sulphide odor was detected while the ozone odor had entirely disappeared.

This experiment could be repeated three or four times, as reported by Jordan and Carlson. They further state "The mechanism of this masking action of ozone does not concern us here." If the authors had considered the "mechanism" of this action, they might have reached entirely different conclusions and would have seen that their experiments were in exact accordance with the theory that ozone oxidizes hydrogen sulphide and other substances.

FATIGUE OF OLFACTORY ORGANS.

They still further refer to the fatigue of the olfactory end-organs by the ozone. They say "strong concentrations of ozone rapidly fatigue or anesthetize the olfactory epithelium." One wonders why the authors did not make this statement general and state what every chemist has frequently observed that *hydrogen sulphide* and the numerous other odors which are present in chemical laboratories produce the same effect on the olfactory epithelium so that these odors are not noticed by workers in the laboratory.

Hydrogen sulphide is also oxidized by the air as is shown by the fact that the odor slowly disappeared in a duplicate experiment in the absence of ozone. (See note on page 19.)

EFFECT OF OZONE ON SMOKE.

Jordan and Carlson undertook to prove that ozone does not destroy smoke by coating a piece of glazed paper uniformly with a thin film of lamp black and subjecting the carbon to the action of ozone for 10 hours and state that there was no effect on the lamp black. They regard this as evidence that ozone does not destroy smoke although they state that smoke also contains carbon monoxide, sulphurous acid, etc. They seem to have made no attempt to study the effect of ozone on carbon monoxide and sulphurous acid but state that the assertion that "ozone destroys smoke" is equivalent to a deliberate deception because ozone does not oxidize carbon particles suspended in the air. Not being chemists, Jordan and Carlson might not have known that carbon is extremely difficult to oxidize, but they should have known that carbon monoxide and sulphurous acid, as well as creosote and other pungent and aromatic organic substances present in smoke produce disagreeable and toxic physiological effects. It is just these constituents of smoke which are easily oxidized by ozone. The carbon which is not acted upon is inert and harmless.

ACTION ON AIR BACTERIA.

Jordan and Carlson also carried out investigations on the action of ozone on air bacteria. As has already been stated, their determinations of the concentration of ozone cannot be relied upon because acidified solutions of potassium iodide were used which give high results. The authors admit that the plate method which they used was not an exact one and that, therefore, the results were irregular. They obtained a reduction of bacteria from 64 to 38, 49 to 18, 61 to 67 (increase), 78 to 34; that is the bacteria were reduced to 40.6%, 63.3% and 56.4% in three tests while in the fourth there was an increase of 109.8%. Most authors would discard the fourth test and consider the reduction to be about 55%. Jordan and Carlson then tried Winslow's more exact method but did not use a large enough sample for the test (4.5 liters) so that the highest number of bacteria counted was 7. It is not good practice in bacteriological work to rely on counts of so small a number. Jordan and Carlson draw the following strange conclusion from their results:

2. The alleged effect of ozone on the ordinary air bacteria, if it occurs at all, is slight and irregular even when amounts of ozone far beyond the limit of human physiological tolerance are employed.

There is no reason to suppose that the ozone used in these experiments was "far beyond the limit of human physiological tolerance." The reduction in the number of air bacteria is not "slight and irregular." The experimental results of Jordan and Carlson agree with the results obtained by the writer in New York school rooms showing a reduction in air bacteria and moulds of 75%, 91% and 91%, the greater reduction resulting from longer exposure to ozone. No ill effects were observed on the children and adults present during these tests.

Jordan and Carlson state: "Some bacteria are undoubtedly killed by ozone, especially if they are in a moist condition." This statement is correct as it is generally recognized that ozone destroys moist bacteria very rapidly. The conclusion drawn by Jordan and Carlson is very far from being correct. They say: "In practice, however, the fact is of very slight importance." The works of Chopin, Doty and of Winslow and Robinson have fairly disproven the belief held so long that bacteria existed as a menace in rebreathed air. It has been shown that infection occurs but rarely from airborne bacteria and then only when the *bacteria are in a moist condition.* It is just these virulent bacteria which are quickly destroyed by ozone even in low concentrations. The bacteria which resist the ozone are powerless to transmit disease.

It is by no means necessary to show that ozone is capable of sterilizing the air in order to show that it is useful in ventilation. There is in fac no other disinfectant which can be used even in low concentrations in living rooms. All other known disinfectants are highly dangerous in concentrations high enough to be at all effective. Ozone in low concentrations will both remove odors and will materially reduce the bacteria content of the air.

EXPERIMENTS ON GUINEA PIGS.

Jordan and Carlson attempted to show that ozone is dangerous by subjecting guinea pigs to high concentrations until the animals died. They also forced strong ozone (10 parts per million) directly into the lungs of dogs and rabbits after performing tracheotomy under ether and inserting a tube well below the larynx and treating the wound with cocaine. They say they did this because at least three-fourths of the ozone is decomposed by the mucous membrane of the respiratory passages. It is difficult to see what bearing this experiment can have on the use of ozone in ventilation. The ozone which was forced into the lungs must have been several hundred times as concentrated as it is ever used in ventilation. It would have been quite as logical to place animals in pure oxygen or even in an atmosphere of 50% oxygen and also force these gases directly into the lungs. When the animals died and the lungs were found to be inflamed, the conclusion might be drawn by highly academic experimenters that it was dangerous to breathe air containing 20% oxygen.

Jordan and Carlson carried out experiments with what might be called low concentrations of ozone. They subjected 4 cats, 4 rabbits, 6 guinea pigs and 12 rats to ozone (of 1 part per million) nine hours daily during two weeks so that

irritation of the eyes and nose was produced. Body weight, appetite and general condition were noted. No ill effects on appetite and body weight or general condition could be observed. The conclusion could, therefore, be drawn that ozone in moderate concentrations is harmless, but Jordan and Carlson warn us that this conclusion is not justified.

They say:

"We desire to state, however, that this test does not warrant the conclusion that the ozone in concentrations that may be used in practical ventilation is harmless to man. Two weeks is a short time in the life of a man. If ozone in ventilation should come into general use, it would mean in the case of office and shop workers, exposure to ozone from six to ten hours a day, six days of the week, from nine to twelve months of the year for from twenty to fifty years. And even if this prolonged exposure to ozone should prove harmless to the robust person, what about the unfortunate person whose lungs have only slight power of resistance?"

Jordan and Carlson seem to have fallen into the error of assuming that because they have not tried to, and therefore have not demonstrated actually, benefit from the use of ozone, this is equivalent to having demonstrated the reverse: i. e., the harmfulness of ozone.

If the facts presented in this paper are properly interpreted they will be found to be in accordance with the view that ozone is a powerful disinfectant and deodorizing substance, which in suitable concentration, is without any injurious effects whatever. The elimination of odor is by no means the least important function of ozone and there is no other agency available except dilution with fresh air. In many cases it is impossible to introduce enough air for this purpose without producing annoying and dangerous drafts of air not to mention expense of blower installation and operation as well as heating the air. As a matter of fact, before ozone was available, disagreeable odors have often been considered unavoidable nuisances which could not be eliminated or overcome.

With reference to the alleged harmful effects of ozone, no single instance of harm to a person from the proper use of ozone in ventilation has been published but all adverse opinions have been deduced, by inference, as in the paper by Jordan and Carlson, from experiments performed with very high concentrations while all efforts to produce harm experimentally with weak ozone have failed.

Jordan and Carlson report that twenty-six animals, exposed for fourteen days, during nine hours each day, to concentrations high enough to cause irritation of the eyes and nose, suffered no ill effects whatever. Hill cites the cases of the numerous workers in the London underground tubes who have shown no ill effect in three years. Gminder cites the unharmed workers in the spinning mills at Reutlingen, and numerous similar instances of prolonged proper use of ozone without a single complaint are to-day in existence. The Jordan and Carlson report is most elaborate and convincing laboratory test that has been published.

NOTE.—*Undoubtedly many of the conflicting conclusions which have been reached are due to the failure of experimenters to take into account the quantitative relations between ozone and the substances to be oxidized and have generally failed to realize that, on account of the much greater intensity of the odor of ozone than that of other substances producing odor, far too little ozone has been employed in the experiments. The odor of ozone is at least one hundred times as intense as that of other substances having a pronounced odor. The common method of using ozone to destroy odors seems to be justified by these considerations. The ozone machines in good practice are operated so that a very small concentration of ozone in the air is produced. The continued renewal of this small amount of ozone oxidizes the odorous substances and gives the total quantity of ozone required by chemical theory.*

Heat Losses from Buildings of Latest Construction

BY J. BYERS HOLBROOK.

(Presented at the recent annual convention of the National District Heating Association, at Rochester, N. Y.)

In maintaining a uniform temperature in any building the heating system is installed or designed for (a) replacing the heat lost by convection and radiation from walls, windows and exposed surfaces;

(b) heating to a desired temperature the air supplied for ventilation and

(c) heating a certain amount of air admitting by cracks, window sashes, etc.

Heating the air (b) supplied for ventilation depends entirely upon the hourly air change desired or the ventilation proper and is not germane to the subject under discussion. The heat losses which we are now considering are those that occur by convection and radiation from walls, window surfaces and the air leakage through sashes, cracks, etc.

The former depend upon a certain coefficient (K) representing for various materials composing buildings, the loss of transmission per square foot of surface in B. T. U. per hour, for each degree of difference of temperature on the two sides of the material. The value of K further depends upon the thickness of the material.

The latter, or the heat lost through leakage, is in a way problematical. It varies as to the window construction, that is, whether the latter is metal or wooden sash and trim.

The constant "K" has been fairly well determined and prescribed by a number of eminent authorities and from an up-to-date schedule I would call the following to your attention to show how this coefficient varies and should be used in buildings of modern construction.

Solid brick wall, 21 in. thick	0.178
Hollow brick wall, 21 in. thick	0.160
Solid granite or marble wall, 21 in. thick	0.315
Hollow granite or marble wall, 21 in. thick	0.255
Brick wall with sandstone faces, plastered on inside, 12 in. brick and 9 in. sandstone	0.160
Concrete wall, 21 in. thick	0.350

The above constants are for walls furred and plastered on the inside with 2 in. terra cotta or wood furring. For walls not furred or plastered it is well to add 20 per cent. For ceilings, assuming temperature of attics as 30° F. above the lowest outside temperature.

Fireproof ceiling (metal lath, no wood above)	0.49
Fireproof ceiling (metal, lath, wood floor above)	0.15
For glass surfaces:	
Glass in single windows	1.00
Glass in double windows	0.50

In the above it would appear that the greatest heat loss takes place through the concrete wall, the smallest loss through the hollow brick wall and in my own practice I would say that I have always proportioned a heating system on very liberal lines where reinforced concrete enters into the construction. Unity or the constant of 1 is a very safe value to use for single windows, and where the air space is provided, the constant can be reduced materially.

By the use of approved metal weather strip the air leakages are minimized somewhat, so that a certain reduction in heating surface can be counted upon.

COMPARISON OF TWO NEW YORK BUILDINGS.

As a concrete example in proportioning the heat losses from modern buildings it may be of interest to cite the comparison of the exposed surfaces of two large New York office buildings for which the writer was the mechanical engineer. The buildings in question are the City Investing Building and the Adams Express Building. The former was erected in 1907, the latter in 1913. A description of the heating and the general mechanical plants of the City Investing Building was submitted to this association by the writer about two years ago.

The inclosure walls for the City Invest-

ing Building were built in accordance with the regular New York City Building Code, which reads:

"Walls of brick built in between iron or steel columns and supported wholly or in part on iron or steel girders, shall be not less than 12 in. thick for 75 ft. of the uppermost height thereof, or to the nearest tier of beams to that measurement in any building so constructed.

"And every lower section of 60 ft. or to the nearest tier of beams to such vertical measurement or part thereof, shall have a thickness of 4 in. more than is required for the section next above it down to the tier of beams nearest to the curb level.

"And thence downward, the thickness of walls shall increase in the ratio prescribed in Section 26, this code."

In designing the new Adams Express Building, Francis H. Kimball, the architect, took exception to the existing New York Building Code and asked permission to make the wall sections of, for example, the north wall, as follows:

From foundation to basement floor level, 24 in. thick.

From basement floor to 22d floor level, 20 in. thick.

From 22d floor level to 27th floor level, 16 in. thick.

From 27th floor level to 32d floor level, 12 in. thick.

In his appeal Mr. Kimball says:

"In my opinion the thickening of these walls to follow the Code requirements is unnecessary, as the building is of skeleton construction, provided with steel in the walls at every story to carry each stretch of wall from story to story, and the weight of each section of wall is not transmitted to the wall section below, but is carried on the steel girders and transmitted to the steel columns.

"The thickening of the walls adds considerable unnecessary weight to the walls, compels an increase in the steel girders and columns in the walls for the full height of the building, as well as larger foundations.

"In view of the fact that a recent ruling of the Department compels us to make our foundations self-contained, we are obliged to use heavy cantilever girders, transmitting a portion of the load of the exterior walls and columns to certain interior columns, and this ruling would also affect these interior foundations."

The Board of Examiners appreciated the wisdom of Mr. Kimball's appeal and approved the same with the result, that the wall was made 20 in. thick from the 22d floor level to basement level, whereas under the regular code the thickness would have been 20 in. from 21st floor level to the 16th floor level and thence increasing 4 in. for each lower 60 ft. downward.

The thickness of walls being decreased, a larger co-efficient of heat transmission (K) has to be allowed, which mutually increases the amount of heating surface required.

In closing permit me to say, that the following formula has, of course, to be used with judgment, depending upon the dictates and experience of the designing engineer.

The writer has in recent years increased somewhat the constants given, and today uses as a basis the following:

$$R = 1.3\ G + 0.08\ W + 0.006\ V.$$

in which R = radiation surface in square feet required.

in which G = glass surface in exposed walls.

in which V = volume of room in cubic feet (assuming one air change per hour in the average office building rooms).

For other forms and types of heating systems the following increases are recommended:

Gravity hot water heating 60% increase.

Regular vapor heating 10 to 20% increase.

Hot water, forced circulation heating 25 to 35% increase.

Indirect steam heating 50 to 60% increase.

Direct indirect steam heating 25 to 30% increase.

Recessed or boxed-in steam radiators 20 to 30% increase.

Tests on Condensation Meters

WITHIN the past year a series of tests was conducted on two types of condensation meters to determine some of their characteristics. The results of the tests were reported at the recent convention of the National District Heating Association by the meter committee.

The devices that figured in the experiments were the Detroit condensation meter, made by the Central Heating Company, of Detroit, and the American District Steam Company's condensation meter.

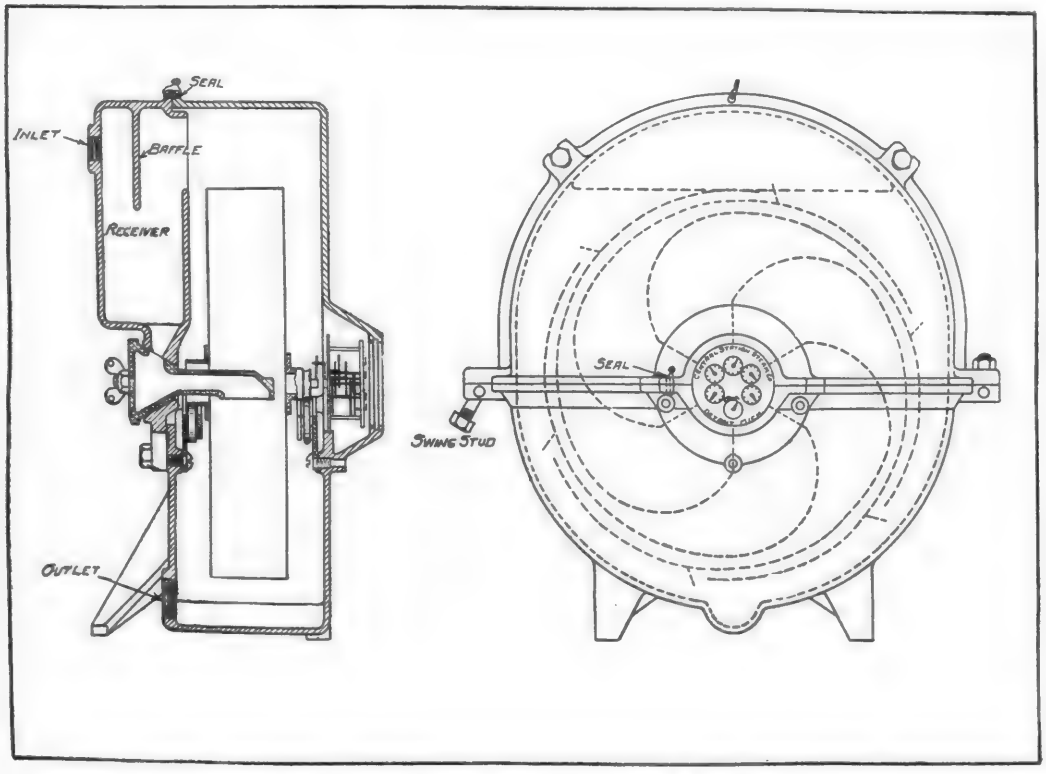
Figs. 1 to 3 show the results obtained.

The first curve sheet shows the variation in accuracy due to change in the temperature of the water passing through the meter. The curves show that the characteristics of the two meters are similar in this respect, and that they follow closely the theoretical curve of specific gravity of water. The maximum variation is less than 2%, from cold water to the boiling point.

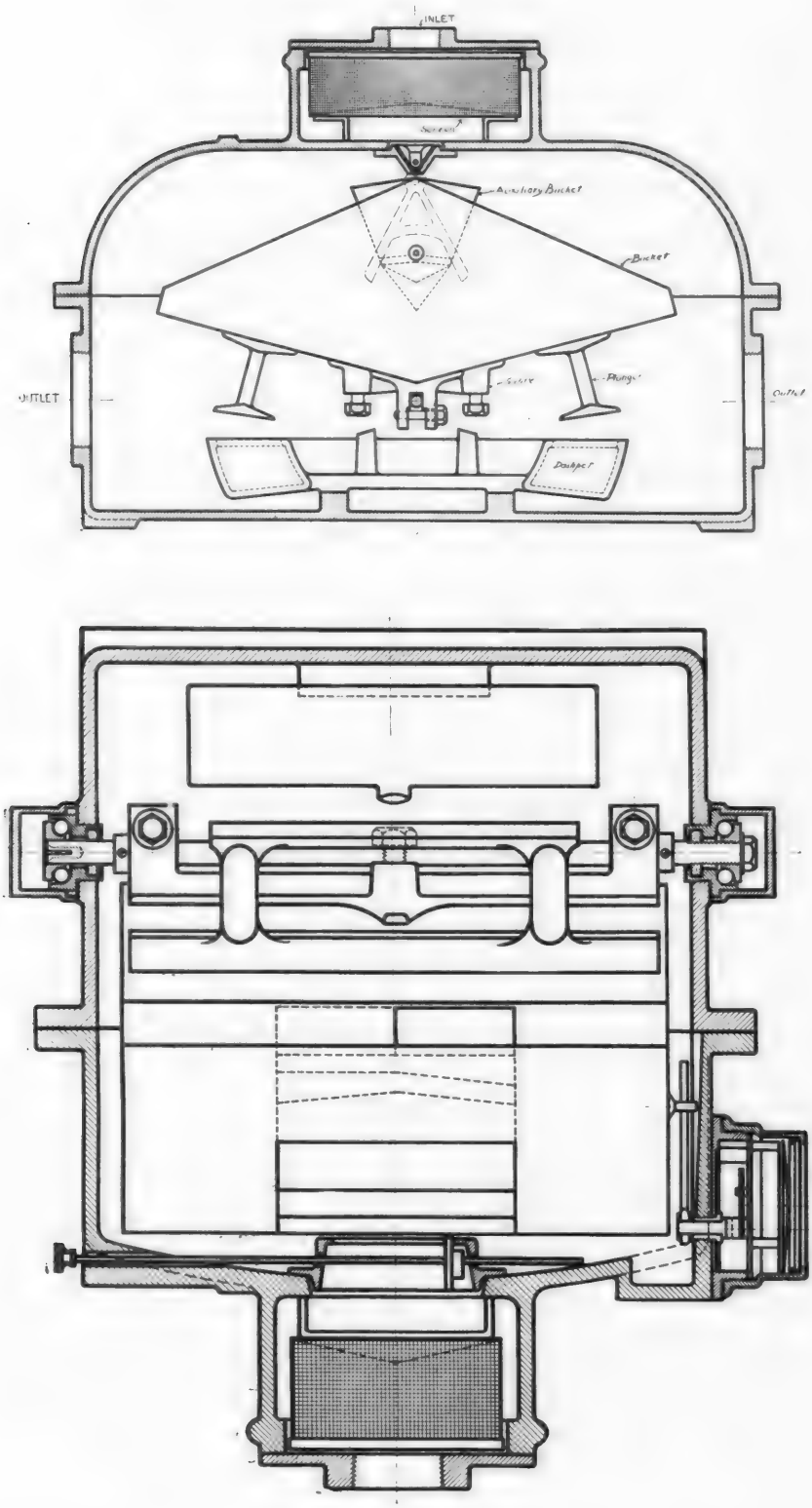
The second curve sheet shows variation in accuracy of the meters from light load to 200% load. The maximum variation is within 2% over that part of range from light load to full load.

The third curve sheet shows effect of steam pressure on these meters, the conditions being similar to these occurring in cases of defective traps, which allow a certain amount of steam to reach the meter, or at least cause the water to be forced through the meter at a high velocity. These tests were taken under conditions as closely approximating service conditions as possible.

A certain amount of radiation was connected to the meter through a valve arranged to act similar to a blowing trap. The curves show quite different results in the two meters. The American District meter stops registering at a pressure of from ¼ to ½ lb. The Detroit meter registers fairly accurately to a pressure of about 3 lbs., above which pressure it begins to over-register very rapidly, due partly to impulse action of the steam and water in the meter drum and partly to



THE DETROIT CONDENSATION METER.



THE SIMPLEX METER.

slopping of the water out of the compartments.

It should be observed that the pressure at which over-registration begins depends

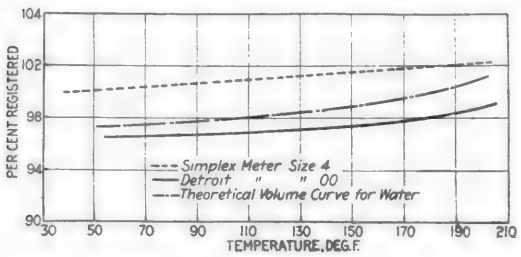


FIG. 1—VARIATION IN ACCURACY DUE TO CHANGE IN TEMPERATURE OF WATER.

upon the amount of water passing through with the steam. The pressures noted were obtained directly at the meter inlet. It should be noted that there is always considerable drop in pressure through the trap, piping, etc., and that these pressures correspond to service pressures several times higher than the figures shown. That is, a pressure of 5 lbs. at the service entrance would ordinarily produce a pressure of less than 1 lb. at the meter, even with trap blowing freely. No great accuracy is claimed for these curves, as it is impossible to obtain consistent data of this nature, but the figures represent approximately the results that may be expected.

METERS MUST BE PROTECTED FROM DIRECT STEAM PRESSURE.

These curves demonstrate very forci-

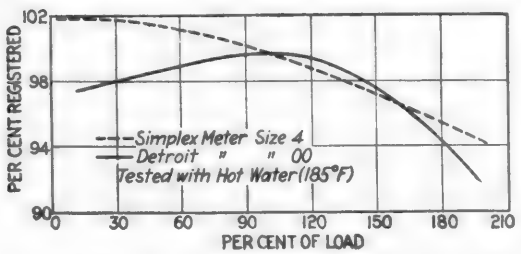


FIG. 2—VARIATION IN ACCURACY OF METERS FROM LIGHT LOAD TO 200% LOAD.

bly the necessity of protecting condensation meters from direct steam pressure, if accurate registration is desired. All traps should be kept in first-class condition. Continuous flow traps, as the latter rather than dumping traps, as the latter discharge the condensation in surges, and frequently with considerable pressure. In cases where the conditions are unusually severe and it is impossible to keep the traps from blowing, some sort of protection should be installed between the traps and the meter. Several devices have been used for this purpose. Among these are the receiving tank and the muffler.

The receiving tank is an open tank, or a tank vented to the atmosphere, which receives all condensation from the traps and allows it to drain gradually through to the meter. Any sudden surges are kept from the meter, and the live steam escaping from the traps escapes into the air without passing through the meter.

The muffler is a device which works on the principle of an automobile muffler. It chokes back any sudden surges or rushes of steam and passes the condensation through to the meter with uniform

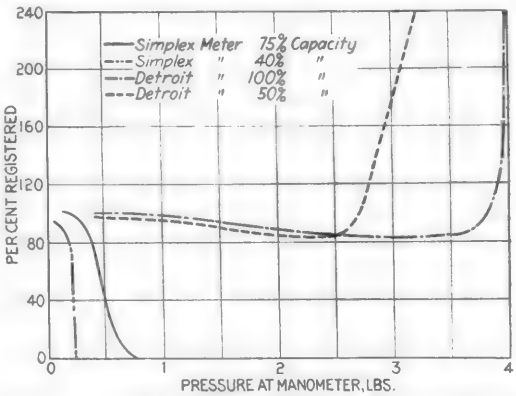


FIG. 3—EFFECT OF STEAM PRESSURES ON METERS.

velocity. A cross-section view of the muffler, as used by one of the member companies, is shown herewith (Fig. 4). It consists of a cylinder 3 in. in diameter and 17 in. long, forming a series of compartments through which the condensation passes in a zig-zag course. It is made in two halves, to facilitate cleaning.

This device has proved very satisfactory in cases of surges or cases of slight

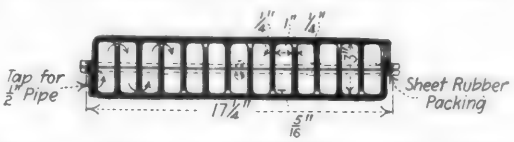


FIG. 4—TYPE OF MUFFLER USED WITH STEAM CONDENSATION METER.

blowing of traps, but it will not stop steam from reaching the meter in cases of continued blowing, although it will

greatly reduce the pressure of this steam, generally to a point low enough to allow the meter to operate accurately.

One of the member companies, using Detroit meters, has done considerable experimental work along the line of incorporating a receiving tank as a part of the meter casing. They have made and put into service a number of meters with a special case, the upper half of which is enlarged and modified to act as a receiving chamber. This chamber has an overflow outlet into the meter casing which permits steam and any excessive surges to escape into the discharge without passing through the meter drum. Tests on these meters show that it is impossible to make them over-register on any ordinary service pressures. The modified meter weighs somewhat more than the standard meter, and costs more, but the additional weight and expense are considered fully offset by the increased reliability.

METER TROUBLES.

The following table shows comparison of meter stoppages in two member companies, using respectively A. D. S. meters and Detroit meters, for five months of the past season:

	A. D. S.	Detroit.
Number meters in service.	250	1250
Stoppages—		
Drum or bucket trouble.	1	27
Bearing trouble.....	4	2
Register and transmission trouble.....	3	5
Miscellaneous trouble..	1	..
Total	9	44
Total stoppages in per cent. of meters in service	3.6%	3.5%

The American District Steam Com-Company has made a number of improvements to lessen meter troubles. Some of these improvements are: Auxiliary compartments in the buckets to improve accuracy, restricted inlet to prevent flooding, screen in the head chamber to catch sediment, roller bearings, and improved mechanism for operating the register.

Sixty per cent. of the stoppages of the Detroit meters were due to drum trouble, and 10% more to transmission and register trouble. On analysis, it appears that most of these stoppages were due to defective construction and assembly, rather than to any inherent defects in the meter. The principal causes were: drum caught on spout, drum caught on casing, hub loose, defective register, defective transmission, etc.

The Central Station Steam Company reports that special attention is now being given to details of workmanship and assembly; and that they believe that these defects have been eliminated. Fig. 5 shows results of periodical service tests on 187 Detroit meters. These meters were tested on the customer's premises, under service conditions. The results

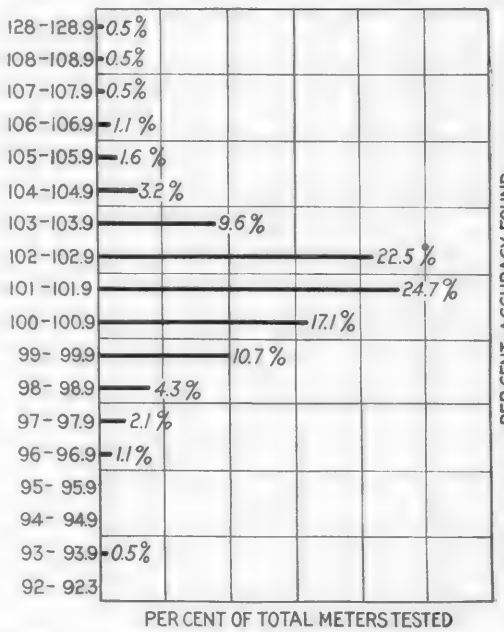


FIG. 5—RESULTS OF PERIODICAL SERVICE TESTS ON 187 DETROIT METERS.

show that the meter compares very fairly with electric meters in the matter of accuracy. No similar data on American District meters has been included, as no such information was available to the committee.

CARE OF METERS.

To insure continued accurate operation, condensation meters should be inspected and overhauled regularly. The meters should be read frequently, at least once a week, and preferably oftener. The readings should be examined, and any sudden decrease in consumption should be investigated. In addition to this, the meters should be thoroughly overhauled, cleaned and lubricated at regular inter-

vals. One company has established a schedule, with intervals varying from three months to two weeks, depending upon the size and importance of the installation. All meters should be given an accuracy test, preferably as connected in service and under service conditions, at least once in two years.

Regulation of utilities by commissions is becoming general, and undoubtedly will ultimately include heating companies. The best preparation that the heating companies can make for such regulation is to establish adequate systems of meter maintenance that will permit of no criticism from such commissions.

Proper lubrication of bearings is one of the most important elements in meter maintenance. With the severe conditions under which meters operate it is difficult to find any lubricant which will remain on the bearings for any length of time; and this is one of the reasons why the bearings should be overhauled at fairly frequent intervals. A series of special lubrication tests were conducted by a member company. Forty-five Detroit meters were put into service with graphiteoleo on one bearing pin, cylinder oil on one, and no lubricant on the other two. The condition of the pins after eighty-one days in service was as follows:

Condition.	Graphitoleo.	Cylinder Oil.	No Lubricant.
Dry and clean..	8	8	15
Dirty	0	0	30
Caked	4	35	0
Oily	33	2	0

The results on the fourth pin are not included here, as special rollers with monel metal bushings were used to determine the results with monel metal running on monel metal.

Twelve of these meters were reported stopped during the test run. Nine of these stoppages were found to be due to dry pins and three to pins lubricated with cylinder oil. None of the pins lubricated with graphitoleo were found stuck. It appears from this data that graphitoleo or some similar compound containing graphite is preferable to oil, as the graphite compound seems to adhere to the surfaces and to prevent corrosion, besides possessing the lubricating qualities of graphite.

THERMOSTATS.

At the last convention there was some discussion of the advantages of flat rates combined with regulation by thermostats, as compared with metered service.

The conclusion of the committee last year was that while there are undoubtedly some advantages in using the flat rate basis, these are more than offset by other considerations in favor of the meter basis. It may be said that the installation of a thermostatic system of regulation is absolutely essential, if the company desires any protection from the wastefulness of the consumer, but this fact in no way admits the superiority of his system over meters.

Effect of Meteorological Conditions on Heat Output of a District Heating Plant.

Interesting data on the heat output of a district heating plant as effected by the weather conditions was compiled during the past winter, by G. E. Chapman, of the Oak Park (Ill.) Yaryan Heating System, which is a division of the Public Service Company, of Chicago, Ill. The data, together with an analysis of same made by H. W. Whitten, of Boston, formed a part of the report of the Educational Committee, presented at the recent annual convention of the National District Heating Association.

The station record, which covers the period from December 1, 1913, to March 31, 1914, includes the total daily heat output, average temperatures, wind velocities and hours of sunshine, with other attending meteorological conditions.

In analyzing these records it was ob-

DECEMBER—1913

Day	Million B.T.U.	Outside Temperature	Prevailing Wind Direction	Average Miles per Hour	Hours of Sunshine
1	1134	51	N-NE	5	0.3
2	1134	49	N-SW	4	0.0
3	1296	45	N	9	0.9
4	1350	48	W-NW	12	8.1
5	1404	42	W-NW	8	1.4
6	1296	45	NE-E	9	0.0
7	2646	28	N-NW	24	1.1
8	2214	23	NW-SW	16	4.1
9	1944	34	SW	18	9.2
10	1674	29	W-NW	17	8.9
11	1766	37	S-SW	12	9.2
12	1458	38	SW	20	9.2
13	1404	42	SW	15	9.2
14	1566	36	SW-N	12	4.5
15	1728	33	NW-SW	12	0.0
16	1620	38	W	16	4.8
17	1782	36	W	14	3.8
18	1728	32	N	7	6.8
19	1728	31	SW-N	11	9.1
20	1674	34	SW	11	0.4
21	1890	26	SW-N	8	9.0
22	1890	27	W-SE	8	9.1
23	1782	33	NE-SW	12	0.1
24	1782	34	N	5	0.0
25	1836	33	N	18	0.0
26	2430	26	NW-N	12	0.4
27	2160	27	NW-SW	10	0.0
28	1944	30	SW	9	1.6
29	2106	31	W	16	1.6
30	2160	24	W-SW	7	2.8
31	1997	27	SW-NW	5	0.0

JANUARY—1914

Day	Million B.T.U.	Outside Temperature	Prevailing Wind Direction	Average Miles per Hour	Hours of Sunshine
1	2052	29	SE	17	0.0
2	1890	35	SE	14	0.0
3	1728	36	NW	12	0.3
4	2160	35	NW	15	0.0
5	2052	29	NW	8	0.0
6	2376	34	W-SW	19	1.3
7	1944	31	SW	14	0.0
8	1836	35	SW	9	0.0
9	2052	33	W-NW	13	0.3
10	2322	22	NW	11	0.0
11	2484	26	W-SW	18	8.5
12	2700	8	N-W	14	9.4
13	2268	19	NW-SE	8	6.9
14	2268	32	SE-SW	18	2.4
15	1890	37	W-S	13	9.5
16	1998	39	W-NW	17	9.2
17	1944	29	NE-N	11	0.0
18	198	31	SW-SE	9	0.0
19	1728	38	SW-S	12	3.1
20	1890	34	NW-W	13	0.0
21	2430	22	W-NW	14	0.3
22	2376	20	W-SE	12	1.4
23	1890	40	SE-W	18	2.2
24	2268	30	N-NE	16	0.0
25	2376	28	N-SW	10	0.0
26	1944	34	NW-SW	17	0.0
27	1728	41	W-NE	13	9.7
28	1728	48	E-S	16	2.3
29	1998	38	SW-NW	20	0.0
30	2376	24	NW-NE	10	2.8
31	2052	28	NE-WS	16	4.6

FEBRUARY—1914

Day	Million B.T.U	Outside Temperature	Prevailing Wind Direction	Average Miles per Hour	Hours of Sunshine
1	2376	22	W-SW	9	10.0
2	2052	35	S-SW	16	0.3
3	2160	28	W-NW	10	8.1
4	2646	10	NW	7	9.6
5	2430	18	NW-NE	9	4.9
6	2160	28	E-NE	12	0.0
7	2646	13	W	18	7.6
8	3078	4	W	23	10.0
9	2700	9	SW-NW	12	6.7
10	2538	10	NW	9	5.0
11	2808	3	NW	12	7.9
12	2862	9	E	18	8.0
13	2538	13	E-NE	11	4.1
14	2538	10	NW	11	10.3
15	2754	7	NW-SW	13	2.1
16	2700	9	NW-SW	14	9.8
17	2052	26	N-NW	12	0.0
18	2538	18	N-NW	7	0.0
19	2322	16	NW-N	11	3.9
20	2268	26	SW	15	6.1
21	2430	19	NE	13	6.0
22	2700	14	NE	22	0.0
23	2376	16	NE-S-SW	14	4.2
24	2322	16	SW	8	8.4
25	2106	27	SW	10	10.7
26	1836	33	S-SW	15	9.5
27	1944	34	SW-NW	12	10.4
28	2268	21	NW-E	18	10.2

MARCH—1914

Day	Million B.T.U.	Outside Temperature	Prevailing Wind Direction	Average Miles per Hour	Hours of Sunshine
1	2700	12	NW-W	20	9.0
2	2322	18	W-NW	10	9.2
3	1998	28	WS-W	8	0.7
4	1836	31	NW-E-NE	8	7.5
5	1728	34	E-E-SE	10	7.4
6	1782	35	E-SE-N	7	2.1
7	1998	29	N-W-NW	12	1.6
8	2214	24	W-NW-W-S-W	11	8.1
9	2214	29	W-SW-W-SW	9	11.6
10	2052	30	N	10	5.8
11	2214	27	N-NW	11	10.7
12	2160	31	S-SW	12	11.8
13	1782	38	SW-S-SW	[illegible]	11.8
14	1512	47	S-SW-NW	12	11.7
15	1404	50	NE-SW	13	11.9
16	1512	44	NW	14	11.6
17	1998	34	NW	15	3.0
18	2106	22	NW-NE	13	5.8
19	2106	22	NE	12	7.4
20	1998	24	NW-SE	[illegible]	10.8
21	1836	30	SE-SW	12	4.9
22	1836	30	SW-NW	12	2.2
23	1890	30	NW-SW	[illegible]	11.2
24	1512	43	SE	10	11.1
25	1296	50	SE	26	9.9
26	1404	49	SE-NE	16	2.8
27	1728	35	NE	17	0.0
28	1448	41	NE-SE	9	0.0
29	1242	50	SE-NE	10	1.8
30	1620	38	NE	18	0.0
31	1512	43	NE-SE	12	1.8

DAILY HEAT OUTPUT, AVERAGE OUTSIDE TEMPERATURES, WIND VELOCITIES, ETC., FOR FOUR MONTHS AT THE OAK PARK PLANT.

DECEMBER—1913

	Temperature Drop below 50°		Wind Miles per Hour		Total	Million B.T.U.		Hours of Sunshine
1	+1	plus	3	equals	4	equals	1134	0.3
2	1	"	4	"	5	"	1134	0.3
3	5	"	9	"	14	"	1296	0.9
4	2	"	12	"	14	"	1350	8.1
5	8	"	8	"	16	"	1404	1.4
6	5	"	9	"	14	"	1296	0.0
7	22	"	24	"	46	"	2646	1.1
8	27	"	16	"	43	"	2214	4.1
9	16	"	18	"	34	"	1944	9.2
10	21	"	17	"	38	"	1674	8.9
11	13	"	12	"	25	"	1766	9.2
12	12	"	20	"	32	"	1458	9.2
13	8	"	15	"	23	"	1404	9.2
14	14	"	12	"	26	"	1566	4.5
15	17	"	12	"	29	"	1728	0.0
16	12	"	16	"	28	"	1620	4.8
17	14	"	14	"	28	"	1782	3.8
18	18	"	7	"	25	"	1782	0.8
19	19	"	11	"	30	"	1728	9.1
20	16	"	11	"	27	"	1674	.4
21	24	"	8	"	32	"	1890	9.0
22	23	"	8	"	31	"	1890	9.1
23	17	"	12	"	29	"	1782	0.1
24	16	"	5	"	21	"	1782	0.0
25	17	"	18	"	35	"	1836	0.0
26	24	"	12	"	36	"	2430	0.4
27	23	"	10	"	33	"	2160	0.0
28	20	"	9	"	29	"	1944	1.6
29	19	"	16	"	35	"	2106	1.6
30	26	"	7	"	33	"	2160	2.8
31	23	"	5	"	28	"	1997	0.0
Aver	15.6		11.6		27.2		1760	3.73

JANUARY—1914

	Temperature Drop below 50°		Wind Miles per Hour		Total	Million B.T.U.		Hours of Sunshine
1	21	plus	17	equals	38	equals	2052	0.0
2	15	"	14	"	29	"	1890	0.0
3	14	"	12	"	26	"	1728	0.3
4	15	"	15	"	30	"	2160	0.0
5	21	"	8	"	29	"	2052	0.0
6	16	"	19	"	35	"	2376	1.3
7	19	"	14	"	33	"	1944	0.0
8	15	"	9	"	24	"	1836	0.0
9	17	"	13	"	30	"	2052	0.3
10	28	"	11	"	39	"	2322	0.0
11	24	"	18	"	42	"	2484	8.5
12	42	"	14	"	56	"	2700	9.4
13	31	"	8	"	39	"	2268	6.9
14	18	"	18	"	36	"	2268	2.4
15	13	"	13	"	26	"	1890	9.5
16	11	"	17	"	28	"	1998	9.2
17	21	"	11	"	32	"	1944	0.0
18	19	"	9	"	28	"	1998	0.0
19	12	"	12	"	24	"	1728	3.1
20	16	"	13	"	29	"	1890	0.0
21	28	"	14	"	42	"	2430	0.3
22	30	"	12	"	42	"	2376	1.4
23	10	"	18	"	28	"	1944	2.2
24	20	"	16	"	36	"	2376	0.0
25	22	"	20	"	42	"	2376	0.0
26	16	"	17	"	33	"	1944	0.0
27	9	"	13	"	22	"	1728	9.7
28	2	"	16	"	18	"	1728	2.3
29	12	"	20	"	32	"	1998	0.0
30	26	"	10	"	36	"	2376	2.8
31	22	"	16	"	38	"	2052	4.6
Aver	19.3		13.7		33		2094	2.38

FEBRUARY—1914

	Temperature Drop below 50°		Wind Miles per Hour		Total	Million B.T.U.		Hours of Sunshine
1	28	plus	9	equals	37	equals	2376	10.0
2	15	"	16	"	31	"	2052	0.0
3	22	"	10	"	32	"	2160	8.1
4	40	"	7	"	47	"	2646	9.6
5	32	"	9	"	41	"	2430	4.9
6	22	"	12	"	34	"	2160	0.0
7	37	"	18	"	55	"	2646	7.6
8	46	"	23	"	69	"	3078	10.0
9	41	"	12	"	53	"	2700	6.7
10	40	"	9	"	49	"	2548	5.0
11	47	"	12	"	59	"	2808	7.9
12	41	"	18	"	59	"	2862	8.0
13	37	"	11	"	48	"	2538	4.1
14	40	"	11	"	51	"	2538	10.3
15	43	"	13	"	56	"	2754	2.1
16	41	"	14	"	55	"	2700	9.8
17	24	"	12	"	36	"	2052	0.0
18	32	"	7	"	39	"	2538	0.0
19	34	"	11	"	45	"	2322	3.9
20	24	"	15	"	39	"	2268	6.1
21	31	"	13	"	44	"	2460	6.0
22	36	"	22	"	58	"	2700	0.0
23	34	"	14	"	48	"	2376	4.2
24	34	"	8	"	42	"	2322	8.4
25	23	"	10	"	33	"	2106	10.7
26	17	"	15	"	32	"	1836	9.5
27	16	"	12	"	28	"	1944	10.4
28	29	"	18	"	47	"	2268	10.2
Aver.	32		13		45		2435	6.2

MARCH—1914

	Temperature Drop below 50°		Wind Miles per Hour		Total	Million B.T.U.		Hours of Sunshine
1	38	plus	20	equals	58	equals	2700	9.0
2	32	"	10	"	42	"	2322	9.2
3	22	"	8	"	30	"	1998	0.7
4	19	"	8	"	27	"	1836	7.5
5	16	"	19	"	26	"	1728	7.4
6	15	"	7	"	22	"	1728	2.1
7	21	"	12	"	33	"	1998	1.6
8	26	"	11	"	37	"	2214	8.1
9	21	"	9	"	30	"	2214	11.6
10	20	"	10	"	30	"	2052	5.8
11	23	"	11	"	34	"	2214	10.7
12	19	"	12	"	31	"	2160	11.8
13	12	"	8	"	20	"	1782	11.8
14	3	"	12	"	15	"	1512	11.7
15	0	"	13	"	13	"	1404	11.9
16	6	"	14	"	20	"	1512	11.6
17	16	"	15	"	31	"	1998	3.0
18	28	"	13	"	41	"	2106	5.8
19	28	"	12	"	40	"	2106	7.4
20	26	"	8	"	34	"	1998	10.8
21	20	"	12	"	32	"	1836	4.9
22	20	"	12	"	32	"	1836	2.2
23	20	"	8	"	28	"	1890	11.2
24	7	"	10	"	17	"	1512	11.1
25	0	"	26	"	26	"	1296	9.9
26	1	"	16	"	17	"	1404	2.8
27	15	"	17	"	32	"	1728	0.0
28	9	"	9	"	18	"	1448	0.0
29	0	"	10	"	10	"	1242	1.8
30	12	"	18	"	30	"	1620	0.0
31	7	"	12	"	19	"	1512	1.8
Aver.	16		12		28		1900	6.6

ANALYSIS OF OAK PARK PLANT RECORDS, SHOWING DROP BELOW 50° F., WIND VELOCITY, ETC., ALSO B. T. U. PER DAY.

served that the warmest days in the period mentioned are at, or nearly, 50° F. Assuming that 1° drop in temperature requires approximately the same amount of heat supply as one mile per hour increase in wind velocity, the drop in temperature below 50° was added to the average wind velocity, or in other words, the heat load was reduced to terms of temperature.

The sum of the wind velocity and temperature drop then compares very closely to the total heat output. Variations occur, but these can partly be accounted for by direction of wind and by hours of sunshine. This latter seems to make a very appreciable showing in the comparisons.

The daily meteorological tables give drop below 50° F., miles per hour of wind movement, the sum of these; also million B. T. U. per day and hours of sunshine per day.

SUMMARY.

A summary shows the following:

	Average Drop Below 50° F.	Wind, Average Miles per Hour	Av. Total	Av. Increase B.T.U. Millions	Av. Hours of Sunshine
Dec.	15.6	11.5	27.1	626	3.73
Jan.	19.3	13.7	33.0	960	2.38
Feb.	32.0	13.0	45.0	1331	6.2
March	16.0	12.0	28.0	766	6.6

Dec. $\frac{626}{27.1}$ equals 23.1. Prevailing direction of wind, S. W.

Jan. $\frac{960}{33}$ equals 29.1. Prevailing direction of wind, S. W.

Feb. $\frac{1331}{45}$ equals 29.58. Prevailing direction of wind, S. W.

Mar. $\frac{766}{28}$ equals 27.35. Prevailing direction of wind, N. W.

The records do not show whether high winds prevailed during the periods of peak load or at other times, and it is not evident how much the difference in prevailing direction of wind affects these results.

Individual instances are of interest.

The severest heating combination in December occurred on the 7th with a temperature of 28° F. and wind movement of 24 miles per hour.

January 12th, 8° F. and 14 miles per hour.

February 4th, 4° F. and 23 miles per hour.

March 1st, 12° F. and 20 miles per hour.

The output on these days was 2646, 2700, 3078 and 2700 million B. T. U. respectively.

The figures for the temperature drop and wind velocity on these days are 46, 56, 69 and 58, respectively.

December 26th was 2° colder than December 7th, but 216 million less B. T. U. was required, the wind being 12 miles per hour less. Very many interesting comparisons may be made.

The committee stated that it was not certain that 50° F. is the right point at which to start drop computations, but was certain that this and other similar records can be made the basis of much profitable study.

It will be noted that there are slight differences between Oak Park and Chicago temperatures. These are not more than might be expected, however.

Commerical Steam Heating in New York City

By GEORGE W. MARTIN

Vice-President, The New York Service Co., New York City.

(Presented at the Sixth Annual Convention of the National District Heating Association, Rochester, N. Y., May 26-29, 1914)

Companies engaged in the generation and supply of steam in New York City appear to be of four general classes, viz.: those operating isolated plants for the supply of light, heat and power, a central station company supplying steam either for heating only or for heating and power purposes; those operating heating plants and supplying janitor service, elevator operators, and the like; and a company operating individual plants for supplying steam for heating only with some for industrial use other than power purposes. So far as the writer knows The New York Service Company is the only one of the last named companies doing business on an extensive scale.

The basis on which such a company may hope to be successful is the assumption of responsibility, systematic inspection to prevent waste, and ability to buy supplies and fuel at wholesale prices. Some of the difficulties met with are that much better service (sometimes unreasonably so) is expected than would be obtained under the owner's operation, the lack of competent men and the increase in cost of fuel due to strikes, storms or the like.

OPERATING AN OFFICE BUILDING BOILER PLANT.

As there seemed to be an excellent opportunity for a company doing business of this nature, in the spring of 1912 The New York Service Company was incorporated under the laws of the State of New York, and to the writer fell the tasks of organizing the office and operating forces.

The first contract was for operating the boiler plant of an office building, which had contracted for the use of central station current for lighting. At a flat rate per annum, steam was furnished for hydraulic elevator operation, restaurant cooking, hot water heating, and in winter for heating the building in addition to the exhaust from the hydraulic pumps.

The building owners retained part of the engineering force on their payroll, while the service company employed the day fireman and night engineer. In spite of this division of authority, things worked harmoniously until, with a change of engineers, came antagonism between the owners' force and the service company's force, resulting in waste of steam, lowering of the quality of service, and continual disputes. Matters ran thus for about two months when the entire force was placed on the payroll of the service company, the additional amount being charged to the owner at cost plus 5%. All the difficulties disappeared thereafter, and the service improved noticeably.

COMPARISON OF OPERATING AT A FLAT PRICE AND AT COST, PLUS A FIXED SUM.

In another case, a loft building, given over largely to printing operations, a flat price was made for operations during the heating season, the service company's work being confined to the boiler room, while the owner's engineer and electrician looked after the operation of the system above ground. Here the owners themselves evidenced no great desire to economize in the use of steam, saying that steam should be supplied at their demand and not at the discretion of the service company. It was sometimes necessary to keep steam on all the building during Sundays and holidays because one of the owners would be working with one or two men in the offices or press room. Our protests against leaky windows, and windows left open with all the radiators on, went unheeded. At the end of the season, however, the service having been satisfactory, we obtained a commendatory letter from the owners.

The following season another agreement was made to operate at cost, plus a fixed sum per month. The change in the attitude of the owners was so marked as to be a matter of some amusement to us. Leaky windows were reconstructed.

a vestibule was built outside the shipping entrance, exposed risers were covered, and strict orders were issued against leaving windows open when steam was turned on. Moreover, the very industrious owner no longer showed a desire to work on Sundays or holidays, except at rare intervals, and each item on the bill for service was closely scrutinized to see if any further reduction could be made. Under this arrangement, also, the owners are willing to supply men from their own force for extra labor, where before it was necessary for the service company to pay these men. The whole arrangement thus makes for economy, and the co-operation of "steam-users" with the "steam-makers." is assured.

One of our office building contracts calls for operation of the boiler room only at cost plus a percentage. The chief engineer is employed by the building, but part of his salary is paid by the service company. This arrangement is not entirely satisfactory, as the engineer receives the same amount per month without regard to the economy obtained in burning coal.

In still another case where steam is supplied under a flat rate per year, the chief engineer is employed by the building, but he is paid a bonus per ton of coal below a standard consumption per month. For lack of a better method, the consumption for each month of the first contract year was taken as a standard and for each month of the second year the engineer received twenty-five cents for each ton below the consumption for the same month of the previous year. The results in this case are gratifying, and show the necessity of making the earning capacity of the man in charge dependent on the economy exercised not only in the generation, but also in the use of steam.

PROBLEMS IN HANDLING LOW GRADE COAL.

Perhaps the greatest problem encountered in our work is in the economical handling of the grade of fuel burned in nearly all our plants. No. 3 Buckwheat is the smallest size of anthracite marketed outside of the coal regions, and requires more than ordinary skill in handling; and, in most cases, forced draft is required for its proper combustion. In some cases, however, good results are obtained with natural draft where the load is light and the fuel bed is never more than 3 or 4 in. thick, with an available draft of from ½ to ¾ in. over the fire.

The tendency of a man unfamiliar with this coal is to fire it too heavy, leaving much of the coal unburned, and tending toward the formation of clinkers. As with any hard coal, the best results are obtained by sprinkling the coal evenly at frequent intervals. No. 1 Buckwheat should never require any leveling, and No. 2 but seldom, but No. 3 Buckwheat sometimes requires the use of a leveler to prevent it from caking and forming clinkers.

In our experience it requires from 1 to 3 months to break in a man on this coal, even though he may have fired No. 1 or No. 2 Buckwheat, for in addition to the handling of his shovel, he must learn to regulate the pressure in the ashpit and also the flue damper so as to obtain a balanced condition over his fire. A handkerchief held at the open fire door and drawn only gently inward by the draft indicates that conditions are about as they should be.

As may be expected, the ordinary underpaid fireman is not the man to handle this coal. In many of the propositions under our system of management, it is necessary for the fireman to have an engineer's license and this fact, together with the required skill in handling the coal, makes it necessary to employ men of intelligence who are better paid than the usual run of firemen.

SCALE OF WAGES.

Our scale of wages for firemen varies from $65 per month, for men working 10 to 12 hours per day under the charge of an engineer, to $90 per month for "shovel engineers" who can not only fire No. 3 Buckwheat economically, but also take entire charge of a boiler plant of from 1,000 to 1,500 horsepower capacity. Coal passers are paid from $50 to $60 per month. Engineers in charge of buildings receive from $100 to $125 per month.

FEED WATER SELDOM MEASURED OR COAL WEIGHED IN INDIVIDUAL PLANTS.

One of the great disadvantages encountered in the operation of individual heating plants is that provision is seldom made by the owners for metering feed

water or weighing coal, and, in some cases, the cost of installing metering or weighing apparatus is an unprofitable burden for an operating company, unless a long-term contract can be made. It is true that an approximate idea of the evaporation may be obtained by installing a hot water meter in the feed line and by measuring the coal by barrow, but hot water meters are not above criticism, and the barrows are not always filled with the same weight of coal, or the firemen may not tally the correct number of barrows.

Where the plant is large enough to require the operation of two or more boilers, an indicating steam meter on each boiler is almost a necessity, while a meter on the main steam line is as necessary as the pressure gauge. Far better results can be obtained if a fireman knows whether the boiler is working under rating, at rating, or on overload.

In our work we have found the Orsat apparatus of great value in the analysis of flue gases, in order to determine how economically the coal was being burned. The work of analyzing is done by our inspector, a technical graduate, who makes irregular visits to the plants under our supervision. Irregular visits are advisable so that the firemen may not key himself up for an expected visit and then fall back into wasteful firing.

In large plants, doubtless, it is an advantage to have an automatic CO_2 recorder that can be checked daily with an Orsat by one of the engineering staff. The fireman of average intelligence can be taught to understand the meaning of a high per cent. of CO_2 and will watch the recorder as closely as his pressure gauge.

Where it is possible to use an automatic CO_2 recorder, it is an easy matter to arrange a bonus system for the firemen based on the records of the CO_2 recorder. For a number of moderate-sized plants, however, it is a difficult matter to work out a bonus system that will be entirely satisfactory to both firemen and employer.

FORMS AND LOG SHEETS.

The New York Service Company has no standard contract form, as we have found that each of our operations differs from the others in so many details that a standard form would be of little use.

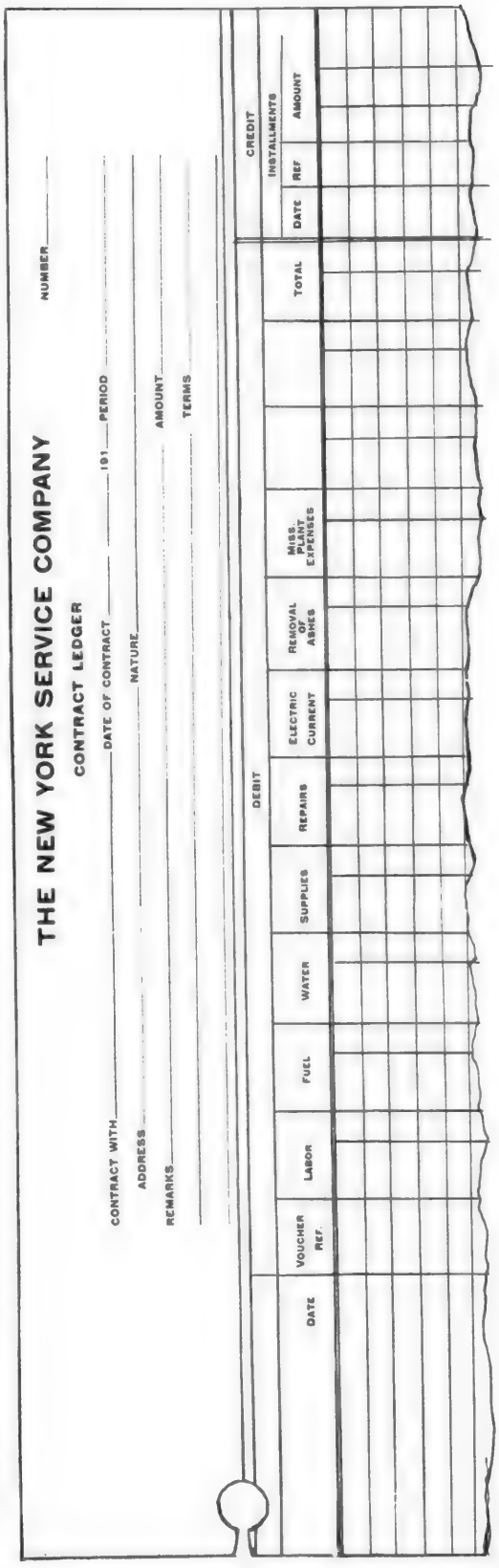


FIG. 1—FORM FOR ITEMIZING MONTHLY COSTS.

When a contract is made for a yearly figure, monthly bills of one-twelfth the total are sent to the customer. This method of billing has the disadvantage that in winter the revenue is sometimes too low to cover the operating costs.

The costs for each month are itemized on the form shown in Fig. 1, which is self-explanatory. The cost of fuel is based on the actual coal used, the stock on hand at the first of each month being carefully measured. Supplies and repairs are not spread over several months unless their cost exceeds $100, when they are placed in a "Suspense Sundries" account and divided among several months or all months of the year.

The plant log is shown in Fig. 2. The columns for supplies and repairs is for material only, any further remarks regarding nature of the work being noted on the back of the log sheet. Each plant is provided with a loose leaf cover to hold these sheets and a similar cover is at the main office to hold the sheets.

Fig 3 shows the card to which the log sheet data are transferred. The columns for boiler room wages and oil, waste, etc., are not used as these items are lumped for the month and entered in the contract ledger.

Actual Heating Requirements of Buildings.

On five buildings, in which heating service is given by The New York Service Company, data have been compiled showing the actual heating requirements compared with the requirements calculated by two different formulas. Table 1 shows the type of building and the data necessary for checking up the actual results, first, by means of a formula derived by E. F. Tweedy, of The New York Edison Company, and, second, by a formula derived by D. S. Boyden, of the Boston Edison Company.

The formula used by Mr. Tweedy is:

$$\frac{W}{4.5} + 2\,G$$

W equals net wall surface.

G equals glass.

By substituting the values of net wall and glass in this formula a figure is obtained which is applied as an abscissa to a curve plotted from the results obtained on a number of buildings in New York

THE NEW YORK SERVICE CO.
320 BROADWAY, N. Y.
BOILER ROOM RECORD

PLANT

Week Ending

	COAL	ASH	WATER METER	TEMP. FEED	K. W. HRS.	REMARKS	SUPPLIES	REPAIRS
SUN.								
MON.								
TUES.								

FIG. 2—PLANT LOG.

Week Ending

PLANT

DAILY BOILER ROOM RECORD

Date	Pounds Coal Burned	Pounds Refuse	Per Cent. Coal	Pounds Water Evaporated	Actual Evaporation	Temp. Feed Water	Boiler Room Wages	Oil Waste etc.	K. W. Hours	

FIG. 3—LOG DATA CARD.

City, and the corresponding ordinate gives the tons of coal per heating season. In the table the results with this formula are given opposite Formula A.

Mr. Boyden's formula is much more complicated, but, in the author's opinion, it has the advantage that it takes into consideration a difference in operating conditions in the different buildings. Unless the formula is used by a person of experience, however, serious errors are likely to affect the variables to such an extent that the calculated result varies greatly from the actual. In the table the results with this formula are given opposite Formula B. The formula follows:

$$\text{Tons of coal per year} = \frac{\frac{V \times a}{60} + (C_1 \times G) + (C_2 \times W)}{C_3 \times (130 - T)} \times L \times d \times h \times \frac{34}{C \times 2000}$$

In the above equation:

V equals gross volume of the building, including basement if heated.

G equals square feet of glass surface, 10% being added for north and west exposures.

W equals square feet of wall surface, 10% being added for north and west exposures.

a equals average air changes per hour during heating period.

C_1 equals constant for glass—1 for single glass.

C_2 equals constant for wall, usually, 0.2 for brick and 0.3 for stone.

C_3 equals constant for local conditions —5.4 for Boston; 5.7 for New York.

T equals factor dependent upon the relation the heating plant bears to the premises heated.

L equals factor for portion of building not heated, or for building not heated to 70° F.

e equals average evaporation in pounds of steam per pound of coal.

d equals number of heating days during season.

h equals average number of hours of heating per day.

It will be seen from the table that for Building No. 1 both formulas agree very well with the actual results. For Building No. 2 Formula A gives a result much under the actual, probably due to the fact that much heat was wasted by leaving shipping doors open and increasing the amount of air change per hour. Building No. 3 also shows a wide divergence

	Bldg No. 1	Bldg No. 2	Bldg No. 3	Bldg No. 4	Bldg No. 5
Total gross volume, cu. ft.....	2,097,800	1,650,000	2,032,000	2,650,000	6,500,000
Type of building.....	Loft (print'g)	Loft (print'g)	Office	Office	Office
Glass surface, sq. ft.....	21,030	12,850	28,690	19,000	57,628
Net wall, square feet.....	91,230	46,190	82,250	100,000	145,362
Heating surface installed, sq. ft.	23,225	15,750	19,800	28,900	52,000
(Includes 20% added for mains and risers)	.....	.....	.....	1,800	12,000
Hours use of steam.....	3,200	3,200	2,300	3,000	3,000
Net tons coal, season 1912-13...	655	486	420	905	1,572
Kind of coal.....	No. 3 Buck	No. 1 Buck	No. 1 Buck	No. 1 Buck	No. 3 Buck
Evaporation, lbs.....	8.5	8	8	7	7
Theoretical Coal, Formula A Tweedy).....	625	380	750	700	1,500
Theoretical Coal, Formula B (Boyden).....	650	469	469	704	1,545

between the result of Formula A and the actual, probably due to the fact that the hours of steam usage were reduced an extraordinary amount through the co-operation of the building superintendent. For Building No. 4 the results by Formulas A and B agree very closely, though both are lower than the actual. In this building the actual amount of coal used for heating was obtained approximately by eliminating from the total coal the amount used for hot water heating, ventilation, and restaurant steam. Steam was kept on all night throughout the winter to heat one floor on which the night watchman spent most of his time, so that above 200 tons of coal are chargeable to keeping one man warm. The results on Building No. 5 agree closely with both the calculated results.

It is apparent from the foregoing that the results by either formula closely approach the actual for normal conditions of operation. When the conditions of operation vary from the normal, however, it would appear that Mr. Boyden's formula gives the better results, since allowance may be made in the calculation for the varying conditions.

Canadian Heating Trade for Separate Contracts.

Among the resolutions adopted at the nineteenth annual convention of the Canadian Society of Domestic, Sanitary and Heating Engineers, which was held in Ottawa, June 9-11, was the following, which was described as an effort "to deal with the elimination of an unnecessary evil," namely, the general contractor:

"Resolved, That the Canadian Society of Domestic, Sanitary and Heating Engineers in annual convention assembled at Ottawa on June 9, 10 and 11, 1914, hereby and do present the following resolution to the Government or its officials for the direct awarding of all contracts for mechanical equipment to be installed in all public buildings throughout the Dominion of Canada:

"1. To include all plumbing, heating of all description, ventilation or electrical construction.

"2. All contracts awarded for plumbing, heating, ventilation and electrical construction amounting to $1,000 or over shall be let direct to the specialist in its various branches on plumbing, heating, ventilating, electrical and other mechanical equipment.

"3. That it is essential to the interests of those various branches of plumbing, heating, ventilation and electrical construction that as the general contractor as a whole is not financially capable of carrying out all fulfillments or requirements laid down by the Government.

"4. The general contractor not being skilled in all these different branches of mechanical equipment such as plumbing, heating, ventilation and electrical construction is not capable of passing on the efficiency of the various work installed.

"5. The general contractor is not and never was entitled to commissions for supervising the work of installing or estimating the plumbing, heating, ventilation or electrical construction in any public building.

"6. That we, the specialists in plumbing, heating, ventilation and electrical construction, are held responsible for work installed in public buildings, should and we hereby pray, that the Government shall see its way clear to let these contracts for plumbing, heating, ventilation and electrical construction direct where the said contract amounts to $1,000 or over."

At a later session it was voted to appoint a committee to interview the Minister of Public Works with a view of securing the direct awarding of government contracts for heating and plumbing work.

Pumpage in a Forced Hot Water Heating System

By Thomas Donahue.

(Presented at the Recent Convention of the National District Heating Association.)

All of the conditions that apply to steam heating also apply to hot water heating, as far as the construction on the outside of the station is concerned; but the question of pumpage does not come up with the steam heating plant.

The question of pumpage, that is, the amount of water pumped per square foot of radiation per hour in a forced circulation system of hot water heating, is so far reaching that a complete analysis would take us beyond a "discussion" of the subject. However, briefly stated, the more important bearings that pumpage has on the operation of a hot water plant are as follows:

1. Why pump the water at all?
2. How much should a square foot of radiation take per hour?
3. Relation of pumpage to pipe line and station equipment.
4. Possibilities of forced circulation hot water heating.

The first question may seem out of order here, but in reviewing the methods of hot water circulation, we find ourselves dealing with two classes; that which requires for its means of propulsion a part of the heat in the water converted into power, viz., gravity circulation; and that class which requires an external power entirely distinct from that contained in the heating medium, viz., forced circulation. The two are intimately related in a central station system and this relationship should never be lost sight of; in fact, the function of the pump should be complete when it has delivered the hot water into the house equipment, and circulation in the house should approach self-propulsion, with the piping so installed that gravity will assist to its fullest extent.

Common practice in the past has loaded everything on to the pumps, and the result is, unbalanced and selective circuits, with untold pumpage through many radiators.

AMOUNT OF WATER PASSING THROUGH RADIATOR.

This brings us to the second question—"How much water should a square foot of direct radiation take per hour?" This can best be answered by first taking the standard of heat emission per square foot of direct cast-iron radiation, which is 170 B. T. U. per hour when the mean temperature in the water is 180°F. The 170 B. T. U. delivered will require about 6 lbs. of water per square foot per hour when the temperature drop in the water is 30°, a condition which has been found practicable, but on account of the past methods of house piping, the amount of water pumped often reaches as high as 50 lbs. per square foot per hour when the differentials are high.

RELATION OF PUMPAGE TO PIPE LINE AND STATION EQUIPMENT.

The third question, "The relation of pumpage to pipe line and station equipment," is now more clear when we know the large amount of water that many heating jobs take. To put it into figures, we will assume a plant serving 100,000 square feet of direct radiation. When properly balanced, this plant should not require more than 600,000 lbs. of circulating water per hour, but it is entirely safe to say that under average present-day conditions, this assumed plant is circulating 1,000,000 lbs. of water per hour. Now, so far as the pipe line, the pumps, and the station condensers and other apparatus are concerned, this plant could as well supply 160,000 square feet of radiation instead of 100,000 square feet, outside of the heat losses sustained in the pipe line due to the water which is circulated, but does no heating.

The third question is probably the most important question we, as managers, have to deal with.

POSSIBILITIES OF FORCED HOT WATER CIRCULATION.

The fourth question, "The possibilities of forced circulation hot water heating," is one which has been discussed back and forth for some time, but its fullest possibilities have not been worked out by any means.

There are several very desirable features in this method of heat transmission which are being recognized more fully each year; principal among them are, greater flexibility, higher efficiencies throughout the system, and greater ease of control with its resultant popularity in the home; so that it is more desirable, in my judgment, than steam.

I made a few tests with reference to determining about how much water would go through certain jobs. We took a residence job that was connected as most jobs are in hot water plants; and in this instance, without any effort on our part to control the circulation in the house. On the street side we had a presure of 32½ lbs., and on the return a pressure of 22½ lbs., or a differential of 10 pounds. We were pumping 13.1 lbs. per square foot. We inserted a differential control valve for this service with 50 lbs. on the service side and 21 lbs. on the house side, and 20 lbs. on the return side, with 1 lb. differential. We circulated 6 lbs. of water per hour and heated the job perfectly. We then adjusted the valve, changing the house pressure to 19 lbs. and the return to 18.5 lbs., and we pumped 4.8 lbs. per foot, and heated the job perfectly.

This test simply shows that the saving in the first instance of the 54% on the pumpage saved, after adjusting the valve, was 63%; and as a central station operator I believe there is more economy to be effected by a little intelligent management on the part of this control, by giving closer attention to detail in the customer houses and reducing your pumpage.

The other elements, according to my experience, that affect a station of that kind that are constant, are not very easily changed except this particular one. In some of the plants that I happen to know about, I know the pumpage can be reduced anywhere from 25% to 50%, which, of course, will mean a resultant decrease in operating cost.

Heating and Ventilation Laws and Regulations in the United States

REQUIREMENTS OF RECENTLY-ENACTED AND OTHER LAWS NOW ON THE STATUTE BOOKS IN THE VARIOUS STATES.

V.

MINNESOTA, TENNESSEE, FLORIDA, LOUISIANA.

"Rules Relating to School Buildings," published by the Superintendent of Education of Minnesota (Bulletin 45), contain the following provisions:

1. Location of Buildings—School buildings shall be placed on high ground at as great a distance as possible from low, marshy ground, and from railroads, manufacturing plants and other sources of noise, smoke and dust. Light from the east is most desirable for class and study rooms, from the north for rooms used for laboratory, manual training, drawing and similar work. Light from the west holds second place only to light from the east. South light should never be used for any of the above indicated rooms.

2. Requirements as to Plans and Specifications—All plans for buildings of four (4) rooms or more must include plans and specifications for plumbing, heating, ventilation and sewage disposal and for all other buildings where any such equipments are to be installed.

3. Capacity of School Rooms—(a) No school room or class room except an assembly room shall provide less than 18 sq. ft. of floor space and 216 cu. ft. of air space per pupil, and no ceiling in buildings hereafter to be erected shall be less than 12 ft. from the floor.

(b) The floor space for rooms used for manual training or home economics shall have at least 35 sq. ft. for each pupil.

4. Heating and Ventilation—(a) A system of ventilation shall be capable of furnishing not less than 30 cu. ft. of air per minute for each person that the room will accommodate when the difference of the temperature be-

tween the outside air and the air in the school room shall be 30° F. or more.

(b) In a gravity system of ventilation in connection with a furnace or steam plant, the flues for admitting fresh air to the room shall have a horizontal area of not less than 1 sq. ft. for every 160 sq. ft. of floor area in the school room. There shall be in a steam gravity system the equivalent of at least 50 sq. ft. of indirect radiation for each square foot of horizontal area of fresh-air flues. An accelerating coil the equivalent of not less than 20 sq. ft. shall be provided for each vent flue.

(c) The flues for a "plenum fan" system of ventilation shall have a horizontal area of not less than 1 sq. ft. for every 270 sq. ft. of floor area of the school room. The ventilation of school buildings by this system shall be so designed that the air pressure in any class room shall be in excess of that of the outside air.

(d) Warm air registers shall be placed about 8 ft. above the floor and shall have an open area of at least 125% of the cross sectional area of the flue. Vent openings shall be placed at the floor level on the same side of the room as the warm-air flues and should have no registers.

(e) In buildings of four rooms or less equipped with jacketed stoves or furnaces, the fresh,air intake and the chimney or vent flue shall have a cross section area equivalent to ¼% of the floor area of the room, but in no case shall the intake pipe be less than 14 in. in diameter, nor the chimney or vent flue less than 16x16 in. inside measurement.

(f) Flues from hoods in chemical laboratories, from domestic science rooms and from toilet rooms shall extend independently to the roof of the building.

(g) The direct-indirect system of ventilation shall not be used. By "direct-indirect" is meant the introduction of cold air from the outside of the building at the base of a "direct" radiator.

* * * * * * * * *

9. Toilets—Toilet rooms shall be located so as to receive direct light and air from the outside. Local vents for water-closets as well as general ventilation for the room shall be provided. The room-vent opening shall be at or near the ceiling.

These rulings are made effective through the passage of a law in Minnesota (Sec. 6, Chapter 550, Laws of 1913), which states that "plans for new buildings or for reconstruction of old buildings must be submitted to the superintendent of education for approval before contract is let or work begun."

Tennessee.

The only law in Tennessee treating directly of ventilation is the Tennessee Sanitary Food Law (Chapter 473, Acts of 1909) This act, which covers bakeries, canneries, slaughter houses, dairies, creameries, cheese factories, restaurants, hotels, groceries, meat markets, and all other food producing establishments, manufactories or other places where food is prepared, manufactured, packed, stored, sold or distributed, directs that they shall be properly lighted, drained, plumbed and ventilated.

Section 10 of this act provides a penalty for violation or refusal to comply with the lawful orders or requirements of the State pure food and drug inspector, such violators being guilty of a misdemeanor and punishable by fines ranging from $10 to $50.

During 1913 a law was enacted creating a department of workshop and factory inspection (Chapter 11)). Section 5 of this act provides "that each deputy inspector of workshops and factories assigned to a district for the inspection of workshops and factories therein shall carefully inspect the sanitary conditions, system of sewerage, situation and condition of water closets, systems of heating, lighting and ventilating rooms where persons are employed at labor, and the means of exit in case of fire or other disasters, within or connected with such workshops and factories. * * *"

Workshops and factories are defined as: "Manufacturing, mills, mechanical, electrical, mercantile, art and laundering establishments, printing, telegraph and telephone offices, department stores, or any kind of an establishment wherein labor is employed or machinery used."

No penalty clauses are contained in the act.

Florida.

The rules and regulations of the State Board of Health (Publication 92) contain the following provision under the heading of sanitation of public buildings:

Rule 39. Ventilation—All churches, halls, theaters and other buildings used for public meeting should be kept at all times in a clean and sanitary condition. Every such building should be provided with proper method for maintaining the purity of the atmosphere and such methods should be employed at all times. The same publication contains extracts from the general statutes of Florida relating to public health and the powers and duties of the State Board of Health. The general powers of the board are defined as covering the general supervision of the public health of the State of Florida, and shall have power to make, promulgate and enforce such rules and regulations as may be necessary for the preservation of same.

In connection with the sanitary inspection

of hotels and boarding houses, the Board of Health is empowered to make examinations covering among other things "The Ventilation Obtainable."

Louisiana.

A law is in effect in Louisiana conferring certain powers upon the State Board of Health, and acting under this authority the board has issued the following rules and regulations regarding the sanitation of public buildings: (Sanitary Code of Louisiana, Sections 119-120)

Every public or government building in this State, and every railroad depot, office building, theatre, lecture hall, auditorium, hotel, restaurant, boarding house, hospital, and other places where numbers of people congregate, must be properly lighted and so ventilated that there shall be 300 cu. ft. of air per hour for each occupant, and rooms or halls where over 150 people congregate must be provided with an exhaust fan for the removal of the lung exhalations and respired carbon dioxide of the occupants.

Schools.—Plans and specifications for every schoolhouse hereafter erected in the State must be submitted to the Parish Superintendent of Schools, and to the State Superintendent of Education, and also to the Parish Health Officer, that it may be determined whether every hygienic or necessary provision is made, especially with reference to ventilation, light and protection against fire.

Every schoolhouse, public or private, or other building used for school purposes, shall be ventilated in such manner as to afford 1,800 cu. ft. of air per hour for each adult, and a proportionate amount for each child, and shall contain not less than 200 cu. ft. of air space for each child to be taught therein. Windows and transoms shall be so constructed that windows may be lowered from the top and transoms opened. Every schoolhouse must be lighted in such a manner as to minimize the eye strain. Each room must contain of actual surface of glass in the windows not less than one-seventh of the floor space.

New Regulations in Massachusetts Covering School Houses.

Form B, as no doubt it will come to be known, has just been issued by the Massachusetts District Police and contains the promised additional regulations for the erection, alteration and inspection of schoolhouses in Massachusetts, based upon the law which went into effect November 1, 1913, entitled, "An Act to Revise and Codify the Building Inspection Laws of the Commonwealth."

Form B relates to graded or high school buildings of medium size, and takes in both public and private schools, academies, seminaries or colleges, containing one or more rooms, where a regular course of instruction is afforded to more than ten pupils at one time.

Under "Boiler, Fuel, Storage and Work Rooms," it is specified that "in buildings hereafter erected, and in existing buildings if so directed, no boiler, fuel, storage or work rooms shall be placed under a corridor, stairway or egress, and wherever located, if so directed, they shall be enclosed in masonry or fireproof walls with fireproof ceilings, and all openings in the walls to the basement shall be provided with self-closing fireproof or automatic fire doors.

The heating and ventilation requirements are as follows:

For a mechanical system with the temperature of the outside air at zero, or for a gravity system with the rooms at 70° F. and with the temperature of the outside air not less than 40° F. below that of the air entering the rooms through the inlets necessary to maintain 70° F. in the rooms, the apparatus shall insure the removal near the floor levels, through ventiducts by the aid of heat or its equivalent, with approved regulating dampers, of not less than 30 cu. ft. of air per minute for each person accommodated in the class, recitation, domestic science and manual training rooms and laboratories, and of not less than 2½ cu. ft. of air per minute for each foot in area of the assembly hall and gymnasium floors.

Such apparatus shall also have means to supply, through properly located inlets, pure air equal to the amount removed, and at such height from the floors as to insure proper circulation, with means for the proper heating of such air when necessary, and with approved regulating, protecting and mixing dampers or other approved methods for regulating the temperature, so that no uncomfortable draughts will be felt and that the difference in temperature between any two points on the breathing plane, not less than 2 ft. from an outside wall, will not exceed 3° F.; and it shall have sufficient means for heating as to maintain a temperature throughout such rooms of 70° F. in zero weather.

The velocity of the air entering the ventiducts in the class, recitation, domestic science and manual training rooms and laboratories shall not exceed 400 ft., in the assembly hall and gymnasium shall not exceed 500 ft., and through the grilles of the inlets shall not exceed 350 ft. per minute. The offices, teachers' and emergency rooms, corridors and wardrobes shall have approved ventilation, and shall be provided with sufficient heat for

their respective uses. The first-story corridors shall have an approved number and class of foot-warmers, where applicable.

Direct radiation may be installed in the class, recitation, domestic science and manual training rooms and laboratories, assembly hall and gymnasium only in such amounts as to heat the rooms to a temperature of 60° F., and in recreation, sanitary and toilet rooms to at least 70° F., in zero weather.

Provisions may be made for reversing any of the above circulation for use when heat is not required, or for an indirect heating system having a plenum or supply chamber below the floor, delivering an approved amount of air to the rooms through perforated chair or desk standards, or their equivalent, and exhausting the same through grilles in the center and near each corner of the ceiling, with approved means for regulating the circulation of the air and temperature of the rooms.

A hood of such size as to carry off all odors, fumes and gases, shall be placed over each stove in the domestic science room and over each demonstration table and compartment in the chemical laboratory and chemical laboratory lecture room. These hoods shall be connected by approved size ducts with ventiducts independent of those for the room ventilation, or, if the combined area of the hood ducts in a room is sufficient, and so arranged, no other exhaust from the room will be required.

All fresh air rooms, heating chambers and heating and ventilating ducts or flues shall be of masonry, or metal of suitable gauge, thoroughly stayed and secured in place. All wall-inlet grilles shall be not less than 1 ft. more in height than the depth of the flue. Steam, hot water, electricity, furnaces or jacketed stoves may be used for heating. Provision shall be made, if so directed, for the installation of a primary heating and air washing apparatus.

Cloth Windows for Schools and Factories.

The use of cloth windows to improve the hygienic quality of the air in schools and factory buildings is being advocated in some quarters on the ground that by this means cold air may be admitted to such rooms but at such a low velocity as to avoid drafts. An experiment is cited made in a modern sixteen-room school which was equipped with a hot blast heating system, supplemented by direct steam radiation, located along the outer walls under the window. To keep the ventilating system in working order, the doors and windows had to be kept closed.

Certain rooms were selected and wooden screens were placed in the lower sashes of the windows, the screens being covered with a medium grade of unbleached cotton cloth. The size of each window screen was 36x40 in.

It was found that in these rooms the stuffiness and odors which had been experienced previously entirely disappeared, as did all snuffling and coughing. The rooms were first heated and the air humidified by means of a steam jet. Just before school opened, the hot air inlets were closed and the cloth windows used. This arrangement was followed except on a few days in midwinter when the wind was high. Ordinarily there were no cold drafts even when the children were sitting within 5 ft. of the windows. It is also stated that the temperature of the room was maintained without difficulty, while the humidity was practically that of the outdoor air. The dust in the air was reduced on the average of 33%. The cloth screens did not interfere with the lighting of the room so long as they were kept clean.

Compulsory Industrial Insurance.

"Every workman in the steel industry has the expectation of nine days lost by sickness in a year as against four days lost by accident, and it is estimated that each year there are 284,750,000 days of sickness among workmen in the United States, costing $792,892,000." said Joseph P. Chamberlain of New York, speaking at the annual meeting of the American Association for Labor Legislation.

"Compulsory sickness and burial insurance is already an accomplished fact in the United States," said Mr. Chamberlain, "but it is insufficient in amount and totally wrong in its method and purpose, and can never be health insurance." That the present insurance of the poor is enormously and hopelessly expensive and promotes extravagant funerals; that workmen do not oppose compulsory insurance, and that contributions of employers is already accepted in principle; that the enormous value of the organization of hospital funds is at present largely dissipated, as well as fraternal society and trade union benefits, so that their combined force are not brought to bear upon the problems of sickness, on the spread of information, and on the enforcement and improvement of legislation; and finally that the problem of sickness insurance through legislation is a problem of the immediate future in America, were the principle arguments advanced.

National Assocation of Master Plumbers.

Action on the recent indictment of members of the National Association of Master Plumbers for alleged violations of the Sherman anti-trust law, was taken at the recent convention of this organization at Atlantic City, when the following resolutions were adopted:

"Whereas, it has come to our notice that some of our members have been indicted by the Federal Grand Jury for alleged violations of the Sherman Anti-trust law, and

"Whereas, this condition is liable to create aprehension and misunderstanding among our members and the public generally as to the position of the National Association of Master Plumbers in respect to the laws of the land, and

"Whereas, it is the duty of this body to protect its own good name and that of its members insofar as our members may be in any difficulty with the Federal Government, or any other interest growing out of their relations with this association; therefore be it

"Resolved, that the incoming board of directors of the National Association of Master Plumbers be instructed that one of their first acts shall be to fully investigate the merits of said indictments now pending, or which may hereafter occur, against our membership wherever located, in consequence of their relations with this Association under the by-laws. That eminent counsel be secured so that justice may be done in every case. It is almost inconceivable that out association itself, or its officers, should have violated any law of the land, at least knowingly, under our charter and by-laws, as we have very earnestly endeavored to respect all laws and regulations of the government as we understand them, and be it further

"Resolved, that nothing be left undone by the incoming board of directors to have the integrity of our association preserved and, if possible, secure through these trials a better understanding of what our duties are under the Federal statutes, and State enactments.

"'Finally, be it further understood that there shall be none of the funds of this association expended, nor any attempt made to defend any one who, in his individual capacity, may be in violation of this or any other law.

"That it is the will of this association in convention assembled that the incoming president and board of directors take immediate steps to provide bonds and counsel to defend all men connected with the association who are now under indictment by the Federal Grand Jury or who may be indicted, and that they shall do all things possible financially and otherwise to prove their innocence of the charge."

The newly elected officers are: President, S. Louis Barnes, Philadelphia; vice-president, James S. Cassedy, Cambridge, Mass.; treasurer, William McCoach, Philadelphia; secretary, D. F. Durkin.

It was voted to continue the Conference Committee which has been working with a similar committee of the master steam fitters' association.

In connection with the efforts being made to pass the separate contract law introduced in Congress, the interesting statement was made that the Supervising Architect was opposed to that feature of the bill which placed the low limit of the cost for the mechanical equipment of a building at $1,000. The Supervising Architect expressed the opinion that if the cost of the mechanical equipment amounted to $20,000 or more, he would be quite willing to separate the contracts. The committee recommended that the $1,000 limit be raised.

On the subject of the working of the anti-trust law where trade associations are involved, it was brought out that representatives of the retail merchants have agreed upon an amendment to the Sherman anti-trust law to the effect that "it shall not be deemed an attempt to monopolize or restrain commerce among the several States to disseminate through trade associations or otherwise, truthful information as to the methods, practices or policies of persons, firms or corporations, engaged in commerce among the several States or with foreign nations."

It was voted to hold the next convention in 1915, in San Francisco.

Glazed Porcelain Radiators.

A new type of radiator made of glazed porcelain was recently exhibited at a building exhibition in Leipzig, Germany. It is claimed that this form of radiator has a higher efficiency than the cast iron type. The general design is similar to a cast-iron radiator, except that the walls are considerably thicker. The sanitary features of its construction are emphasized.

Open Roof Theatres.

Something new in the way of building construction has been adopted in Buenos Ayres, South America, for moving picture theaters, which is designed to solve the ventilation problem. An oval opening is left above the center of the auditorium, making it practically an outdoor theater. A canvas cover is provided to be pulled across the opening in case of rain or inclement weather.

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COMING as it did just before the convention season, the recent indictment of members of the National Association of Master Plumbers for alleged violations of the Sherman Anti-Trust law was in the nature of a bomb, not only to the master plumbers themselves, but to the heating fraternity as well. According to the recent interpretations of this law it has become a very fine point to tell where legitimate trade association activities to better trade conditions may go before they become "in restraint of trade." It is evident the Master Plumbers' Association has been unable to tell, because the alleged violations complained of, for the most part, have been widely practiced by both State and local associations as coming quite within the letter and spirit of the law.

The Master Fitters' Association has been even more cautious, but in that body, care was taken at its recent annual convention to emphasize the point that its "Trade Resolutions" were in no sense to be construed as a direct effort to limit or control its members in the purchase of material, but were solely for their information. Here again the dividing line may be hard to determine, as was evidenced by the fact that many manufacturers were unwilling to take a stand one way or the other on the question, with the result that their names were omitted from the association's "List in Accord."

That trade associations are seriously concerned over the situation is shown by the proposed amendment to the Sherman law put forward by the retail merchants' organization to the effect "that it shall not be deemed an attempt to monopolize or restrain commerce among the several States to disseminate through trade associations or otherwise, truthful information as to the methods, practices or policies of persons, firms or corporations, engaged in commerce among the several States or with foreign nations."

Until some such interpretation of the law is made the present situation must be a difficult one for all associations engaged in this kind of work.

IN the meantime, such work as the conference committee of the Master Steam Fitters' and Master Plumbers' associations has been doing in furthering the separate contract movement is along lines about which there can be no question, and if the proposed national law, designed to separate the contracts for the mechanical equipment of Government buildings, is passed, it will be distinctly a trade association triumph and, in many ways, the most important it has ever achieved.

The committee placed the matter in a convincing light when it stated that it costs the trade, as a whole, more to estimate for general contractors than is realized from the profits made on all the work obtained. Explanations were given to show just how this comes about. Once these facts are fully understoood the battle will be more than half won. The trouble at present is that the "independents" in the trade do not see this side of the question.

NATIONAL ASSOCIATION OF MASTER STEAM AND HOT WATER FITTERS

WHO HELPS ME I HELP

Twenty-Sixth Annual Convention Atlantic City, N. J.

June 10-13, 1914

It was a typical gathering of the clans at the twenty-sixth annual convention of the National Association of Master Steam and Hot Water Fitters, at Atlantic City, N. J., June 10-13, 1914. More than the usual proportion of the "old guard" was present, and while a number of absentees was noted in the supply trade, this only served to make the meeting all the more a "steam fitters'" convention.

While nothing of importance was given out, considerable interest was manifested in the Government's suit against members of the Master Plumbers' Association, charging restraint of trade, and the possible bearing this might have on the "List in Accord," published by the Master Fitters' Association. President Denny referred to the matter in his address, expressing his belief that the explanation of the real purpose of the "List in Accord," as published in the association *Official Bulletin*, to the effect that the list was merely for the information of the members, covered every point that might be raised.

JOHN T. BRADLEY, ST. LOUIS.
Newly-Elected President, National Association of Master Steam and Hot Water Fitters.

Following committee meetings on June 10, the first general session was opened Thursday morning, June 11, with President Edward B. Denny in the chair. Mayor Riddle, of Atlantic City, was introduced and, as he expressed it, opened one of his canned speeches which, it developed, was one of welcome to plumbers rather than to steam fitters. On being tipped off by one of the Atlantic City delegates in the middle of his address, he came back cleverly by stating that, judging from the prices charged by both crafts, he was unable to distinguish one from the other and felt that he was not so far off the track, after all.

Following the address of welcome, President Denny presented his address, which was widely commented upon as a masterly review of prevailing conditions in the trade, as well as a concise summing up of the year's work of the association.

Mr. Denny has travelled extensively during the past year in the interests of the association, visiting some 135 cities and consulting with the leading members of the trade in each city. The first-hand information he was thus enabled to obtain was both timely and authoritative. The principal portions of his address are given herewith:

President's Address.

The report of the Committee on Standardization will advise you of the arduous and difficult work it has done during the year, especially in connection with the Schedule of Flanged Fittings and Flanges. It seemed at one time that our many years of effort to establish a uniform schedule might be entirely nullified. This result was prevented by the wise action of the committee in arranging for a conference in the city of Washington, D. C., of all parties interested, at which conference a basis of agreement was reached, eventually resulting in the final adoption of the uniform schedule.

The wisdom of comtinuing the Joint Conference Committee of our association with that of the National Association of Master Plumbers will be made evident to you as you learn of its work through the report of the board of directors. In visiting the trade I have found everywhere the educational leaflets and cards prepared and sent out by this committee. They are doing, quietly, a great work in improving the business methods of master steam fitters and plumbers throughout the country.

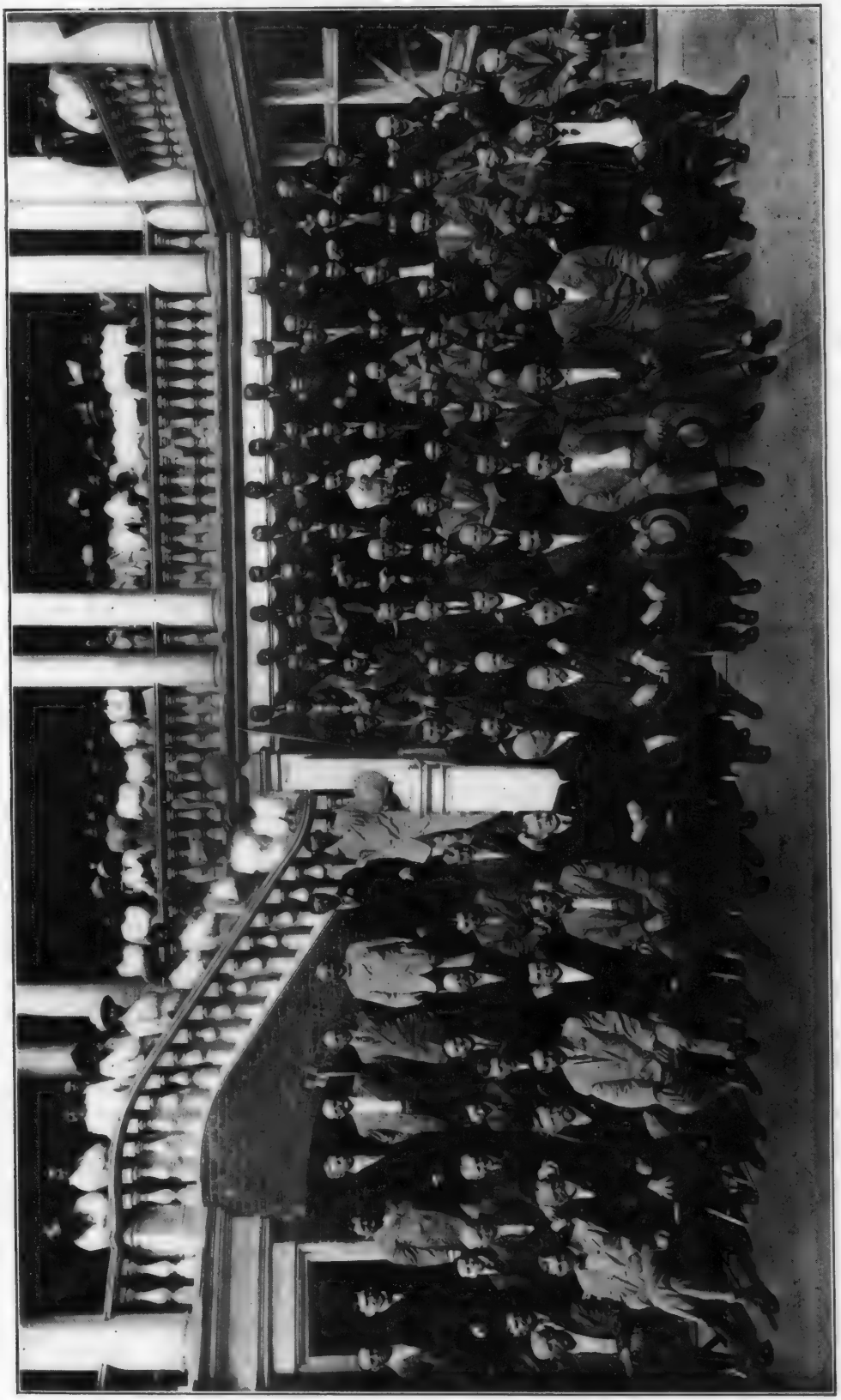
EFFORTS TO COMBAT SUB-CONTRACTING EVIL.

The work of the Conference Committee in its efforts to subdue and destroy the sub-contracting evil is bearing fruit. Because of the resolution passed by the American Institute of Architects at their convention in December last, many architects who had before included the heating and plumbing in general contracts are now providing for separate contracts for our work direct with the owner. Efforts to secure the separation of mechanical equipment from general contracts in State, county and municipal buildings, have been successful in several States, and bills providing for such separation are pending in the legislatures of other States. In the National Congress is pending a bill to secure such separation in United States Government contracts. This bill is known as House Bill 14288. It is now in the hands of the Committee on Public Buildings and Grounds. I think it would be right for us to express and forward to that committee our approval of the measure. Let us urge every member to cut out the estimating to general contractors, and in every possible way to strenuously oppose the practice of sub-contracting.

MENACE OF LOW COMPETITIVE BIDDING.

There is more or less complaint about the sale of materials by the manufacturer and dealer direct to the consumer, and about the losses and annoyances arising from the sub-contract evil; but the one great evil is the low competitive bidding, which eliminates all profits on contract work. Doubtless each delegate to this convention knows that this is true in his own city, but has supposed it was different in other cities. I want to say to you that it is almost universal. A very large proportion of the contract work done by the master steam and hot water fitters of the country is done at prices which do not repay overhead charges. In many cities these conditions have caused the more competent and responsible master steam fitters to abandon the business; many others would gladly do so if they could retire without debt. During this year of "psychological depression" these conditions are intensified and the resulting distress is widespread. It may be said that just at this time all business is similarly affected. I think not. In the steam-fitting business there is comparatively little jobbing and repair work. Or, it may said that this condition is but the operation of the law of the survival of the fittest. The trouble is, the fittest are not surviving. Instead of "competition is the life of trade," such competition means ruin to the more competent and responsible men in our business.

The work of education is true association work. As you all know, our national association, through the Conference Committee, has given much thought and attention to it for three years past. I hope it will receive even greater attention in the future. And I want to suggest to you that our work in this direction should not be confined to our own members, as has been so largely the case in the past. Outside of our membership, in nearly every city, there are numbers of men lacking in business training, but seeking to get heating contracts at any price that will pay them journeyman's wages. These men, even more than our own members, need our educational work. For our own welfare we should



CONVENTION PHOTOGRAPH, NATIONAL ASSOCIATION OF MASTER STEAM AND HOT WATER FITTERS, ATLANTIC CITY, N. J., JUNE 10-13, 1914.

see that they get it, and thus in saving others we may, in a measure, save ourselves.

The following committee appointments were then made:

Credentials—A. E. Kenrick, Massachusetts; W. A. Lawson, New Jersey; M. G. Sellers, Pennsylvania; C. J. Little, Ohio; F. G. Merewether, Rhode Island.

Nominating—S. A. Jellett, Pennsylvania; G. H. Zellers, District of Columbia; W. H. Curtin, New York; Otto Wurm, Michigan.

Constitution and Rules for Convention Procedure—F. G. Carthey, Utah; William Anderson, Pennsylvania; Frank Leavery, New York.

Appeals and Grievances—J. A. Ziesse, Michigan; N. J. Heill, Texas; Edward F. Joy, New York.

Association Improvement—N. L. Danforth, New York; F. H. Meadows, Wisconsin; Joseph Young, New Jersey.

Auditing—J. E. Rutzler, New York; N. P. Bishop, Connecticut; S. A. Jellett, Pennsylvania.

Resolutions—N. P. Bishop, Connecticut. D. W. Chapman, Ohio; P. Gormly, Pennsylvania.

SECRETARY'S REPORT.

The report of Secretary Henry B. Gombers showed a net gain in membership of 219, 320 members being added to the roll and 101 dropped. The total membership of the association is now 911. The report stated that very few complaints of any sort have been lodged during the year at National headquarters. On the subject of standardization, the report stated that "whatever the outcome as to one feature of the consummation of a universal standard for flanged fittings and flanges, it will always remain a fact that to this association and none other belongs the credit for bringing about that for which we have fought for nine years. As a matter of fact, it was in June, 1905, in the room where we are now meeting, that the subject of a uniform standard to provide for interchangeability of flanged fittings was first broached."

TREASURER'S REPORT.

Treasurer Juan A. Almirall reported:

Cash on hand May 1, 1913...	$8,778.15
Receipts, May 1, 1913, to May 1, 1914.....	19,850.82
Total	$28,628.97
Expended, May 1, 1913, to May 1, 1914.....	20,015.40
Cash balance, May 1, 1914..	$8,613.57

BOARD OF DIRECTORS' REPORT.

The report of the board of directors stated that by far the most important achievement of the joint conference committee made up of representatives of the Master Fitters' and Master Plumbers' Associations, has been its work in conjunction with the American Institute of Architects regarding the separation of contracts. The report also stated that "this committee had hoped at this time to be able to submit to you for approval an estimate form covering the larger installations of heating and ventilating apparatus. However, so much time has necessarily been devoted to other and seemingly more urgent matters, and there is such a wide difference of opinion as to what should be incorporated in such a form, that we have considered it wise not to present it at this time, but to assure you that a great deal of progress has been made and to express the hope that before another convention a form may have been devised which will meet the approval of a large majority."

REPORT OF COMMITTEE ON TRADE RELATIONS.

"We have the same old complaint," stated the report of the committee on trade relations, "from Washington, D. C., from San Francisco, Cal., and some other cities—that is, jobbers and manufacturers do sell to consumers. Your committee believes that this state of affairs exists to a more or less extent throughout the country, and it might be well that the subject be discussed in this convention.

"In the report of this committee to the conventions of 1912 and 1913 the question of eliminating the contracts for our work from general contracts was mentioned, and we are pleased to say that this work is going on in a very satisfactory manner, and that contracts for heating, ventilating and plumbing work are being made direct with owners to a much greater extent than ever before."

RESOLUTIONS ADOPTED.

Acting on the recommendations contained in the various committees' reports, resolutions were adopted recommending

that the joint conference committee appointed to confer with a like committee of the National Association of Master Plumbers be continued.

It was also resolved that the association, in convention assembled, approve of House Bill No. 14,288, known as the Taggart bill, which is now in the hands of the committee on public buildings and grounds, and recommend its passage without amendment as to trade included.

Another resolution recommended that the matter of standard estimate sheets be left to the discretion of the incoming board of directors.

It was resolved that "The 1915 U. S. Standard" Schedule of Standard and Extra Heavy Flanged Fittings and Flanges, adopted on March 20, 1914, by a joint committee of the National Association of Master Steam and Hot Water Fitters, the American Society of Mechanical Engineers and the Committee of Manufacturers on Standardization of Fittings and Valves, be adopted.

It was also "Resolved, that the standard rating of house-heating boilers, adopted by our committee on standardization in conjunction with a committee of the Boiler Manufacturers' Association, be approved."

Additional resolutions of thanks were extended to the officers, committees and others, including the trade press.

NEW OFFICERS.

At the last open session on Friday, June 12, the following officers were placed in nomination by the nominating committee and unanimously elected:

President, John T. Bradley, St. Louis.

First vice-president, Juan A. Almirall, New York.

Second vice-president, Frank G. Carthey, Salt Lake City, Utah.

Third vice-president, Edward Grassler, Milwaukee, Wis.

Treasurer, John E. Rutzler, New York.

Board of directors: Newly-elected officers and Edward B. Denny, Newark, N. J.; W. H. Cahis, Boston; N. Loring Danforth, Buffalo, N. Y., and N. P. Bishop, Hartford, Conn.

Sergeant-at-arms, John C. F. Trachsel, Philadelphia.

During the installation ceremony the occasion was taken advantage of by President T. B. Cryer of the New Jersey State Association, to present the retiring president, Mr. Denny, with a handsome inkstand in appreciation of his valuable services to the National Association during his three years' incumbency of the office.

The installation then proceeded, with the new president, John T. Bradley, in the chair, who quickly disclosed his qualifications as a presiding officer by his comments and rulings which more than once brought down the house.

Moving Pictures on Pipe Manufacture

One of the treats of the convention was a display of motion pictures in the Green Room of the St. Charles, given under the auspices of the National Tube Company, exhibiting the various processes in the manufacture of "National" pipe. Frank N. Speller, metallurgical engineer for the company, was on hand and, in a most interesting manner, explained the pictures as they were shown. The company was also represented at the lecture by Robert M. Hall. The pictures and address were thoroughly enjoyed by all present and at their conclusion the company was given a rising vote of thanks.

The Entertainment.

Entertainment was afforded the members and guests by a committee composed of the manufacturers and supply men present. Immediately after the first open session, the Manufacturers' and Supply Men's Entertainment Committee met with W. G. LeCompte in the chair and J. Barton Garfield as secretary. Plans were outlined for the entertainment, which included the use of roller chairs by all at any time, and the holding of bowling tournaments Friday evening. A match game was arranged between the manufacturers and master fitters, while the ladies held an individual tournament.

After an exciting match of three games, the manufacturers pulled out a victory, the members of the winning team being A. C. Downs, C. S. Wood, A. H. Ross, J. M. Watson and W. P. Thompson. The team representing the master fitters was made up of N. L. Danforth, S. A. Jellett, Otto Wurm, E. Edward, F. Joy and A. H. Meadows.

In the individual ladies' tournament, the prizes were won, in the order named, by the following: Mrs. W. H. Curtin, Mrs. John A. Cullen, Detroit; Mrs. Arthur Ritter, New York; Mrs. Joseph A. Geoghegan, New York; Mrs. Homer Addams, Philadelphia; Mrs.

Julius A. Ziesse, Grand Rapids, Mich; Mrs. Eugene McCloskey, St. Louis; and Mrs. John T. Bradley, St. Louis.

The manufacturers' entertainment committee, in direct charge of the events, was composed of Messrs. Issertell, Cosgrove, Wood and Green. The roller chairs were looked after by Messrs. Ritter, Kiewitz and Quackenboss. Charles A. Miller acted as captain of the manufacturers' bowling team, While J. Barton Garfield, assisted by Messrs. Issertell and Norton, had charge of the ladies' bowling tournament. G. H. Chasmar looked after the arrangements for the men's bowling match.

At the conclusion of the tournaments, the party returned to the St. Charles where the prizes were distributed by the new president, John T. Bradley, and a light supper served.

The meeting of the Eastern Supply Association and of the master steam fitters in Atlantic City at nearly the same time provided an opportunity for a meet of the Eastern Trade Golf Association which was held on the links of the Atlantic City Country Club, June 10. In the morning round, individual handicap medal play, the winners were W. H. Thayer, R. B. Hunt, C. S. Wood and H. B. Cole. In the afternoon, four ball matches were played and the prizes in this event were won by C. S. Wood and E. J. Hughes, P. H. Seward and Conway Kiewitz, and H. B. Cole and W. H. Thayer. The winner of the match play event against bogey was J. Barton Garfield. Special prizes for this tournament were provided by the Manufacturers' and Supply Men's Entertainment Committee.

Exhibitors.

Borden Co., Warren, O., had a display of its Beaver pipe cutting and threading tools, including its new 4-in. cutter. A. F. Howe, who was in charge of the exhibit, distributed a clever souvenir in the form of a watch chain, to be attached at the coat lapel.

Bernhard Water Tube Boilers, made by the Kanawha Mine Car Co., Charleston, W. Va., were brought forcibly to the attention of the delegates through the display of a 27-S steam boiler, rated at 900 sq. ft., which was set up in open air in the loft adjoining the St. Charles and shown in full operation by J. B. Bernhard. A 20-ft. stack was attached to the smoke outlet and the water supply was drawn through a temporary pipe line connecting with the water pipe on the lawn of the St. Charles. The novelty of the idea attracted much attention to the exhibit. The display also brought inquiries from those interested who happened to be passing on the Boardwalk from which it was in full view.

Many of the delegates took advantage of the occasion to inspect the exhibit of the Master Car Builders' Association, which was going on at Young's Pier. The entire pier was given up to the exhibit and as the master fitters' association button gave admission to all parts of the pier, this point was a favorite spot during the leisure hours of the delegates.

THOSE PRESENT.

Mr. and Mrs. N. P. Bishop, New Haven, Conn.
C. A. Best, C. K. Foster, A. K. Root, Chicago.
Geo. E. States, Topeka, Kan.
R. H. Dowing, Bangor, Me.
C. H. Eastman, G. D. Hoffman, W. H. Thayer, A. F. Sawyer, J. D. Stiles, Mrs. J. F. Buerkel, Mr. and Mrs. W. H. Oakes, Boston.
A. E. Kenrick, Brookline, Mass.
Mr. and Mrs. G. A. McLain, Springfield, Mass.
C. P. Atwood, Salem, Mass.
P. C. Smith, Jr., of Westfield, Mass.
H. T. Cole, E. E. McNair, Mr. and Mrs. J. A. Cohen, Mr. and Mrs. Otto Wurm, Detroit.
Mr. and Mrs. J. A. Ziesse, Grand Rapids, Mich.
Mr. and Mrs. J. F. Bradley, Mrs. and Miss McCloskey, St. Louis, Mo.
Frank Walsh, Wm. Riddle, R. R. Albertus, Geo. J. Hughes, C. Fraubes, D. H. Moore, Jos. Young, John H. Moon, Atlantic City, N. J.
Geo. Koppel, E. K. Webster, Camden, N. J.
E. D. Smith, Elizabeth, N. J.
P. Gormly, Morristown, N. J.
Chas. S. Wood, of Montclair, N. J.
Mr. and Mrs. E. B. Denny, T. B. Burke, C. C. Johnson, W. A. Lawson, A. H. Ross, Mr. and Mrs. M. W. Whitlock, Miss C. H. Fine, Newark, N. J.
L. W. Butterfield, Orange, N. J.
Mrs. K. Kensell, Passaic, N. J.
Chas. W. Sinley, of Vineland, N. J.
A. B. Weaver, Mr. and Mrs. Samuel Wright, Miss M. J. Wright, Mr. and Mrs. N. L. Danforth, Buffalo.
Mr. and Mrs. J. T. Sadler, Elmira, N. Y.
W. R. Stockwell, Irvington, N. Y.
Mr. and Mrs. Arthur Ritter, Mr. and Mrs. W. H. Curtin, of Borough of Brooklyn.
R. W. Hillman, A. N. Chambers, B. K. Stradler, Gustave Petersen, A. S. Appleton, H. R. Watson, J. B. Garfield, Conway Kiewitz, Chas. A. Miller, A. S. Armagnac, Mr. and Mrs. G. N. Mahaney, Henry C. Issertell, J. J. McKee, J. W. Hook, Chas. E. Gordon, W. A. Thompson, Mr. and Mrs. E. T. Child, Mr. and Mrs. H. B. Gombers, J. A. Almirall, W. G. Le Compte, J. D. Erskine, Mr. and Mrs. J. C. Faulkner, Mr. and Mrs. C. A. Geoghegan, Miss Helen Geoghegan, Chas. D. Osborn, W. J. Olvany, Mr. and Mrs. W. P. Davenport, Miss Davenport, Mr. and Mrs. L. H. Quackenboss, New York City.
Mr. and Mrs. D. F. Hennessey, Mr. and Mrs. T. F. Hennessey, Oswego, N. Y.
Mr. and Mrs. J. R. Sheehan, Schenectady, N. Y.
Mr. and Mrs. E. F. Joy, Mr. and Mrs. F. Leavery, Miss Leavery, Syracuse, N. Y.
A. C. Eynon, D. W. Chapman, Canton, O.
Chas. W. Cromb, Warren, O.
Mr. and Mrs. C. J. Little, Youngstown, O.
A. C. Edgar, Geo. W. Barr, A. H. Pierson, John L. Mayer, W. P. Thompson, Stewart A. Jellett, Stewart A. Jellett, Jr., H. H. Hellerman, Geo. D. Steele, Miss N. D. Barnhurst, E. S. Concanna, Mr. and Mrs. H. G. Black, Mr. and Mrs. Homer Addams, Master Paul Addams, E. H. Giles, W. F. Emery, K. Duff, R. C. Bolsinger, F. W. Dows, Mr. and Mrs. M. G. Sellers, Wm. M. Anderson, T. H. Garvin, G. A. Eagan, John C. F. Trachsel, A. W. Proctor, A. S. Mappett, E. R. Steinmetz, H. T. Murphy, Philadelphia, Pa.
F. Maginn, R. W. Scott, W. F. Hughes, J. J. Burns, R. M. Hall, Pittsburgh, Pa.
J. A. Goodrich, Huntington, Pa.
Mr. and Mrs. J. P. Butterly, Scranton, Pa.
F. G. Merewether, Providence, R. I.
F. Hutchison, Herndon, Va.
J. B. Bernhard, of Charlestown, W. Va.
Mr. and Mrs. N. S. Hill, Waco, Texas.
G. H. Chasmar, Geo. H. Zellers, Washington, D. C.
F. H. Meadows, H. W. Ellis, of Milwaukee, Mis.
F. G. Carthey, St. Lake City, Utah.

NATIONAL ASSOCIATION OF MASTER STEAM AND HOT WATER FITTERS

Iowa State Association.

At the annual meeting of the Iowa State Association, at Des Moines, the following officers were elected: President, R. Knauer, Des Moines; vice-president, W. Lavelle, Sioux City; secretary treasurer, W. Ewinger, Burlington; directors: M. J. Corcoran, Des Moines; A. C. Anderson, Boone; J. F. Garvey, Mason City, and J. E. Dustin, Fort Dodge.

New York State Association.

New officers elected at the annual meeting of the New York State Association, which met in Rochester May 12, are as follows: President, Frank Leavery, Syracuse; vice-president, N. Loring Danforth, Buffalo; secretary-treasurer, William H. McKiever, New York; board of directors: William H. Curtin, New York; Richard Hankin, New York; H. W. Jones, Rochester; Edward F. Joy, Syracuse; Jeremiah R. Smith, Oneida; sergeant-at-arms, William Scollay; recording secretary, Henry B. Gombers, New York. The principal guest at the convention was National President Edward B. Denny, who spoke on the opportunites for work in a State association. The pending legislation in Washington, providing for the separation of Government contracts was endorsed. A committee of three was appointed to draw up a digest of the points involved in the new Workmen's Compensation Law, which went into effect July 1. The convention was followed by a dinner at the Hotel Rochester in the evening.

Pennsylvania State Association.

The efforts of the Pennsylvania State Association to enforce the State law regarding the separation of contracts on public buildings occupied a prominent place in the deliberations of the twenty-fifth annual convention of the association at Wilkes-Barre, May 12. It was voted to continue the efforts to secure a strict enforcement of this act in co-operation with the Master Plumbers', Electrical and Sheet Metal Contractors' Associations. The officers elected were: President, William P. Thompson, Philadelphia; vice-president, C. Burchfield Kennedy, Pittsburgh; treasurer, Harry G. Black, Philadelphia; secretary, M. G. Sellers, Philadelphia; executive committee: Edward R. Steinmetz, Philadelphia; B. Harold Carpenter, Wilkes-Barre; Joseph A. Langdon, Pittsburgh; C. Edward Hantz, York; and Joseph F. O'Hora, Scranton; sergeant-at-arms, John C. F. Trachsel, Philadelphia.

New President of the National District Heating Association.

The accompanying portrait is one recently taken of the new president of the National District Heating Association, W. R. Wetherell, of Peoria, Ill. Mr. Wetherell is superintendent of the steam heating department of the Central Illinois Light Co., and is well known among district heating engineers as a compiler of valuable data on central heating work.

W. R. WETHERELL, PEORIA, ILL.
Newly-Elected President of the National District Heating Association.

E. C. Molby Appointed Sales Manager for the Surrell Boilers.

E. C. Molby, for many years eastern district manager for the Pierce, Butler & Pierce Mfg. Co., Syracuse, N. Y., has resigned to take the position of sales manager for the Surrell Down Draft Boiler Co., 39 Cortlandt Street, New York. Mr. Molby was tendered a dinner by his associates June 26 on his retirement and was presented with two traveling bags as a token of their esteem.

Fire partially destroyed the boiler plant of the Richardson & Boynton Co., at Dover, N. J., June 28. The company announces that its deliveries will not be affected and that the plant will be rebuilt at once.

THE CONSULTING ENGINEER

"The Consulting Engineer" is prepared to reply, in this department, to any questions which our readers may ask regarding problems connected with the design and installation of mechanical equipments of buildings.

33—Method of Testing Radiators.

QUESTION: We have a new type of radiator or convector which is constructed of sheet metal on the fin principle or with extended surfaces. This cannot be rated in the same manner as the standard cast-iron radiator, and we are desirous of ascertaining the comparative heating effect and the cost per unit of heat transmission. Can you suggest some simple method that can be used by ordinary mechanics at slight expense and at the same time establish the comparative cost to manufacture understandingly?

ANSWERS: Fig. 1 shows a method by which this can be accomplished. The two radiators are placed on a table or platform with a partition P and P′ in the same manner as if they were placed against a wall.

The whole apparatus can be set up out of doors in some place where there is no wind or in still air. In this manner the question of rise in temperature and heat losses of a room are obviated and the two radiators to be tested are under exactly the same conditions.

S is the steam pipe at around 5 lbs. guage pressure. B is a separator of a piece of pipe with caps and drip so as to insure dry steam. The branch connections L L′ should be exactly the same as to fittings, length and size pipe, and should be thoroughly insulated for the best results. If no covering is available, the exposed surface can be calculated and added to that of the radiator.

A is a throttling valve to reduce the pressure from 5 lbs. to 1 lb. guage, the pressure

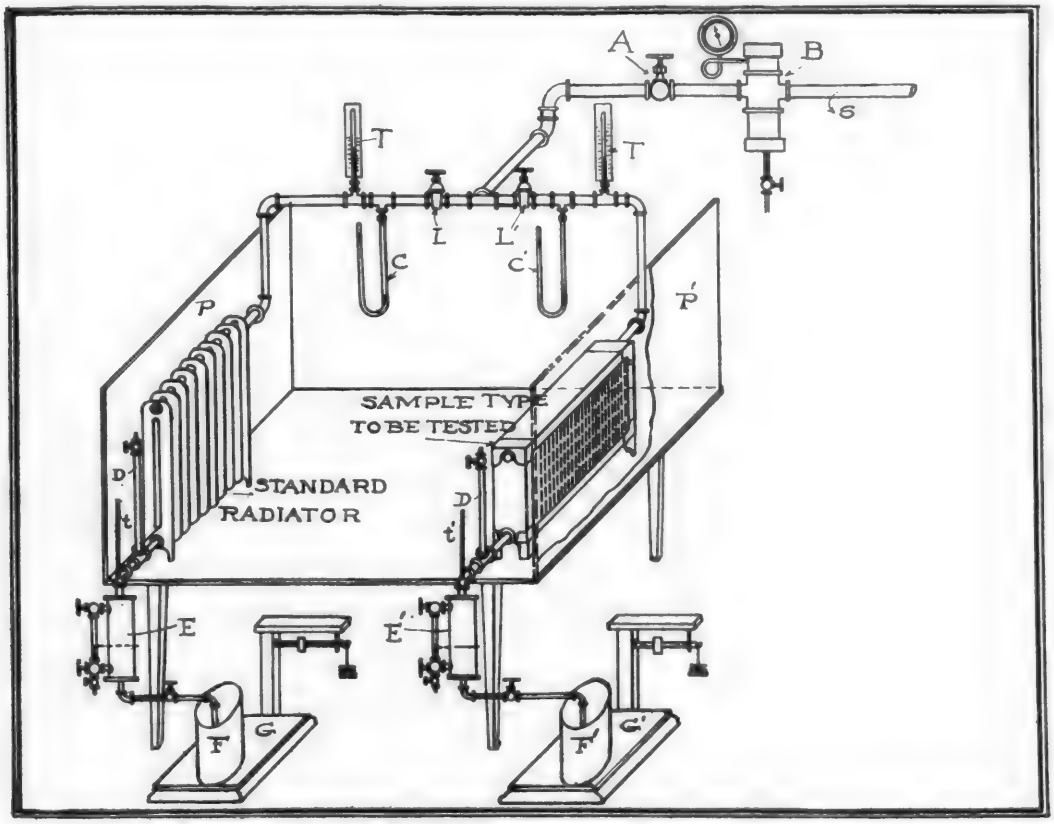


FIG. 1—DIAGRAM OF METHOD FOR TESTING RADIATORS.

being measured by the water columns C C'. If expense is no object, the valve may be replaced by a reducing pressure valve, making the operation automatic.

The object of the above arrangement is to insure dry steam without the use of a calorimeter with all its chances of error in the hands of inexperienced operators.

By adjusting the valves A-L-L' with water column C C' and thermometer T T', a pressure of 1 lb. gauge or ½ lb. gauge can be registered and thermometers T T' will register ½° to 1° F above the corresponding temperature indicated in the steam table for gauges C C', in which case there is from ½ to 1° superheat, which insures dry steam.

If 1 lb. is carried, the difference in height of water column C C' will be 2 ft. 4 in., and the temperature of T T' will be 216° F. If ½ lb. is carried the gauge will register 1 ft. 2 in., and the temperature will be 215° F.

The condensation from the radiators is intended to be caught in the receivers E E' and drawn off at intervals and weighed. Receivers E E' may be made of 4 in. pipe about 18 in. long, and the water level should be the same at the end of the test as at the beginning.

By weighing the condensation over a period of three or four hours from each radiator, and multiplying by the latent heat of evaporation for the corresponding pressure on the gauges C C', the total B. T. U. per hour can be determined for each radiator. Thermometers t and t' are placed in the return so that any wide fluctuation in temperature can be noted.

If the connections are covered, and fairly large radiators are used up to the equivalent of 100 ft., the radiation of the connections will be minimum, but constant for both. If the radiators are small, say 10 or 15 sq. ft., the radiation of the connections will be a source of error.

When the condensation of each radiator is found and multiplied by the latent heat of the corresponding pressure, the B. T. U. per hour can be determined for the standard and trial radiator, respectively, and if the cost of the radiator to be compared is known, the cost in terms of the standard radiator can be determined for the same heating effect.

It would be well to record the air temperature of outside air at intervals during the period of test. Accurate scales, preferably of the Toledo type, should be used, as the results depend on the accuracy with which the water is weighed.

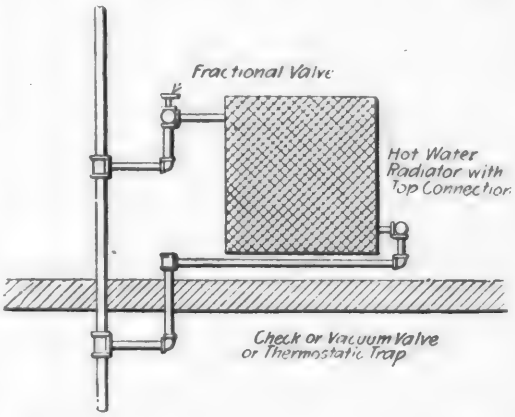
This is a test that any steam fitter can set up in his yard and make with a very slight expenditure of money. The only care required is the manipulation of pressures and temperatures at the beginning. With a fairly constant outside temperature, when the pressure and temperature are once manipulated, and the apparatus all heated up, the conditions should remain nearly constant. As the water rises in the reservoirs about to the mark made on the gauge glass, it can be drawn off and weighed.

34—Relative Values of One and Two-Pipe Heating Systems.

QUESTION: What are the relative values of a one-pipe and two-pipe steam heating system?

ANSWER: A heating system may be designed on the one or two-pipe plan and there will be little, if any, difference in the operation or in the first cost of installation if they are both properly laid out. The one-pipe steam system simply involves the flow of steam and return condensation in the same pipe and, therefore, one large pipe is required instead of two smaller pipes.

The same troubles are liable to bother the fitter with a one-pipe as with a two-pipe layout. Greater troubles appear in the single



ARRANGEMENT OF MODULATION SYSTEM FOR ONE-PIPE, DOWN-FEED.

pipe work on horizontal runs, than where the pipes are vertical.

There are two principles that should be borne in mind in laying out steam or hot water work. The flow of the fluid, water and steam, in supply and return should be in the same direction and, in one-pipe work, away from the source. Where one-pipe risers are used, the supply of steam from above is preferable rather than from below and radiators should be as close as possible to the riser. If far away, two-pipe connections should be made.

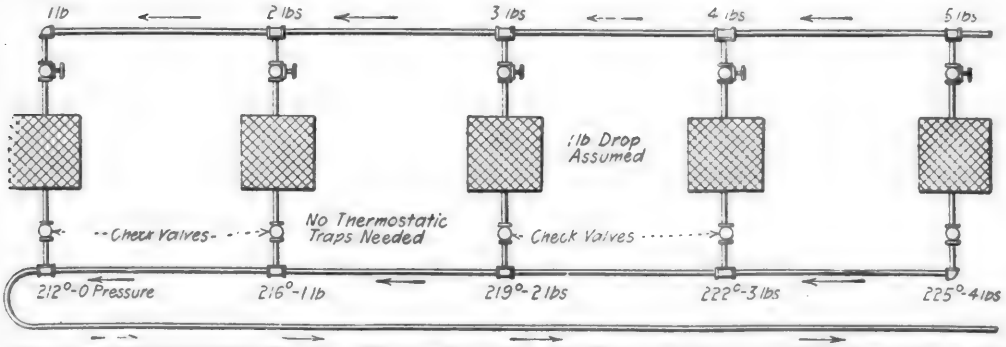


FIG. 2.—ARRANGEMENT OF STEAM OR HOT WATER MAINS TO OBTAIN THE SAME DROP THROUGH THE SURFACE AT ALL POINTS, INDEPENDENT OF THE DROP IN EITHER SUPPLY OR RETURN MAIN.

If one-pipe risers are desired and the radiators are some distance away, connections like those in reply to question No. 15 may be made. Question No. 15 also applies to this portion of the subject.

LEGAL DECISIONS

Provision for Contractor's Bond-Waiver.

A contract for the installation of a heating plant required the contractor to give bond guaranteeing compliance with specifications. In an action to enforce a mechanic's lien for the installation it was held that the fact that the owner urged the contractor to install the plant when he knew such bond had not been given and used the building after such installation did not amount to a waiver of such provision, since the owner's rights did not depend upon the bond, but the giving of the same was a condition precedent to the contractor's right to recover.—Symms-Powers Co. vs. Kennedy, South Dakota Supreme Court, 146 N. W. 570.

Agreement to Refrain from Business—Breach.

The plaintiffs, a firm engaged in the heating, plumbing and tinwork business, entered into a written agreement with the defendant, K, and his brother, doing the same kind of business in partnership in David City, by which the latter firm sold to the plaintiffs their stock of plumbing goods, supplies, tools and fixtures. The contract provided that K. would not go into or conduct, directly or indirectly, a heating, plumbing or tinwork business within the county of Butler, Neb., for a period of ten years. The plaintiff alleged that K. had undertaken to install a heating plant for one Bunting in a building in David City, and was then engaged in the work. An injunction was sought to prevent further breaches of the contract. The agreement was admitted by the defendant, K., and that he worked for Mr. Bunting in installing a heating plant; but he contended that he might, under the agreement, perform work of this kind by the day, or for daily or monthly hire, and alleged that he was paid by the hour. He testified that he helped Mr. Bunting to select the furnace installed; and that while his firm was in business it was not unusual for them to help their customers to select the heating apparatus which they afterwards erected by the day, hour, or job.

Contracts of this nature are not unlawful. The real question in the present case was whether the contract was broken by the vendor entering into contracts to install heating apparatus and other work to be paid for by the hour, day, or piece. It was held that the vendor had broken both the letter and the spirit of his contract. The mere fact that he did not carry a stock of materials on hand was of little consequence. It was not intended to determine that the vendor in such a case may always be prevented from entering the services of a competitor as a workman. The rule would be different where the workman is practically merely a cog in a machine and his personality and business-getting ability are submerged in his work. An injunction was granted to restrain the defendant's further continuance of such business.—Ammon vs. Keill, Nebraska Supreme Court, 146 N. W. 1009.

Heating Contract—Substantial Performance.

A heating company contracted to install in an owner's premises a boiler of the capacity of 5,000 sq. ft. of radiation, the boiler to be insurable. The boiler installed fell short one-third in capacity, and a casualty company refused the insurance on the ground that it was structurally defective. In an action by the heating company on the contract it was held that there was no sufficient performance of the contract, and there could be no recovery on the ground of substantial performance; such recovery being permitted only where the omissions are unsubstantial and such as the

parties are presumed not to have had in contemplation when making the contract.—McElreavy & H. Co. vs. St. Joseph's Home, Mun. Ct., 143 N. Y. Supp. 235.

AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS

Dr. Milton W. Franklin on "Theories of Ventilation."

The last meeting of the Massachusetts Chapter before the summer recess was held in Boston, May 12, the principal guest being Dr. Milton W. Franklin, electrochemical engineer of the General Electric Company.

Speaking to the topic, "Theories of Ventilation," Dr. Franklin said:

"We engineers have generally had to sit aside and listen to a lot of Latin and therapeutic phrases which certainly are as confusing to many as nautical phrases are to the landlubber; but, on the other hand, professionally, the physicians having made a study of medicine cannot wholly appreciate our thoroughly mechanical ideas, and that accounts for the clash between them, we looking to the doctors for a remedy, and they condemning what we have executed, supposed to be with the best of judgment."

Dr. Franklin compared these theories with the more exact services of the civil engineer and prophesied that, within five years, laws of the various States now based on imperfect knowledge would be revised in the light of new information which would come from the biologist. He very forcibly brought out the inadaptability of the physician to accomplish what the public demands now in ventilation, pointing out the wonderful strides that have been made for suffering humanity in most every other conceivable line, whereas, in this, the most important of all, we had stood still, and in some cases gone backward. He promised that with data he is now compiling he would give the heating engineers' society some definite provable facts so that we can stand up and in an intelligent way answer questions that the public demand, so that there will be less waste of money, especially in school ventilation. He took one definite stand, that at the present time the temperature, humidity and odors were the only three important factors to be considered, and considered that the amount of air now demanded in school rooms had been decided upon without any scientific basis of fact as to the amount of air the body really needed to keep it in perfect running order. He quoted German and European professors and experts on ozone and said that while he claimed no medicinal properties or benefit or wonderful cures from the use of ozone, yet ozone could and would destroy odors and that was its field.

Many questions were asked the doctor, resulting in a lively discussion. A rising vote of thanks was given him.

A. B. Franklin, vice-president of the society, stated that the Massachusetts Inspection Department of the District Police had accomplished much, being a pioneer in what we had accepted as a standard, but he admitted that there was possibly a great field for advancement, and it is for the engineers to unite all over the country in order to accomplish the desired results.

F. S. Boltz, of the American Radiator Co., was greeted as a new member of the local chapter, and the meeting was adjourned until next October.

New Members.

As the result of a ballot canvassed June 1, announcement is made of the election of the following members:

Arthur Stowell Armagnac, 1123 Broadway, New York City.
Frank Lyman Austin, 240 College Street, Burlington, Vt.
Benamin A. Broom, 400 United Bank Building, Sioux City, Iowa.
Dwight I. Cooke, 561 West Monroe Street, Chicago, Ill.
James F. Cyphers, Merk & Co., Rahway, N. J.
Oscar H. Fogg, 128 East 15th Street, New York City.
Harry S. Haley, 434 Holbrook Building, San Francisco, Cal.
George A. Henrich, 5661 Ridge Avenue, Chicago.
Jeremiah J. Herlihy, 751 West Van Buren Street, Chicago.
E. Vernon Hill, Health Department, City Hall, Chicago.
H. C. Kimbrough, 900 First National Bank, Chicago.
Everett B. Langenberg, 4057 Forest Park Boulevard, St. Louis, Mo.
Homer R. Linn, 321 South Ashland Avenue, La Grange, Ill.
John L. Moyer, Juniper and Cherry Streets, Philadelphia.
J. Ernest MacDonald, 1206 Monadnock Building, Chicago.
William Malls, 800 Grand Avenue, Temple, Kansas City, Mo.
Thomas H. Monaghan, 730 West Monroe Street, Chicago.
David M. Myers, 17 Battery Place, New York City.
Ralph Waldo Noland, Purdue University, La Fayette, Ind.
Curtis W. Petry, 24 Lenox Road, Rockville Centre, Ill.

ASSOCIATE MEMBERS.

Arthur F. Knowles, 9 Church Street, New York City.
A. J. Purcell, P. O. Box, 728, Little Rock, Ark.

JUNIOR MEMBERS.

Eugene L. Barnes, Hoge Building, Seattle, Wash.
Alfred Earl French, 1102 Swetland Building, Cleveland, Ohio.
Frederick C. Heiles, 60 New Street, East Orange, N. J.
William M. Larimer, Albert Lea, Minn.

Current Heating and Ventilating Literature.

Under this heading is published each month an index of the important articles on the subject of heating and ventilation that have appeared in the columns of our contemporaries. Copies of any of the journals containing the article mentioned may be obtained from THE HEATING AND VENTILATING MAGAZINE *on receipt of the stated price.*

HEAT LOSSES—

Transmission of Heat through Building Materials. Frank L. Busey. Considers heat losses and how to determine them. 1500 w. Power—April 21, 1914. 20c.

LARGE BUILDINGS—

Heating and Ventilating Large Buildings. Charles L. Hubbard. Matters relating to the care and management of the heating equipment. 2000 w. Prac Engr, Chicago—April 15, 1914. 20c.

OZONE—

The Bactericidal, Deodorizing and Physiological Effects of Ozone. F. V. Wooldridge. Discusses its use from the standpoint of therapeutics and sanitation. 1500 w. Eng News—April 9, 1914. 20c.

Hygiene and the Use of Ozone for Ventilation. Prof. Czaplewski. Considers the hygienic importance of ozone in purifying and improving the air and its use in artificial ventilation. 6500 w. Met & Chem Engng—April, 1914. 40c.

STEAM HEATING—

Report of Committee on Steam Heating. Read before the Nat. Elec. Lgt. Assn. at Chicago, Ill., June, 1913. A general discussion of the elements which affect the profitableness of central steam-heating plants. 36 pp. Nat Elec Igt Assn—1914. Price on application.

Central Station Heating Costs.

Investigations made by a committee of the Des Moines Chamber of Commerce in a number of cities in the Middle West where central station heating plants are in operation have revealed some interesting figures, showing generally the advantages of central heating. Of more than 150 replies received, all but one reported that the service is satisfactory. The full statement of the committee is as follows:

The Chamber of Commerce special committee, appointed to investigate central heating plant conditions in other cities with a view to determining the desirability of the McKinley installation in Des Moines and the granting of a franchise, has come to some definite conclusions.

The committee finds from the figures submitted that as a rule central heating costs a little more than heating by means of individual plants.

It finds, however, that this added cost is more than made up for by the fact central heating is found to be much more convenient and satisfactory for the reason that as much or as little heat as is desired may be used and because the steam is always at hand.

Merchants report that there is a saving of stocks of merchandise by reason of minimizing the damage to goods exposed on shelves to dust and smoke.

Building owners report that there is a material saving in cost of up keep of building exteriors, window janitor work, etc., through almost complete elimination of smoke damage.

Of over 150 replies received all but one reported that the service is satisfactory in every way and that they would not go back to the old style of individual heating plant.

The committee is of the opinion that if rates approximating those charged in other cities could be obtained for Des Moines that the system would be popular and in a short time would be patronized by all building owners in the business district, thus completely eliminating the smoke nuisance down town.

It is not ready, however, to accept the rates proposed for Des Moines as reasonable and is inclined to the opinion they are not proportionate when compared to those in force in other cities. It is not ready yet to pass finally upon the reasonableness of other conditions named in the franchise draft.

COMPARISONS IN DES MOINES.

The committee submits herewith figures on cost obtained in other cities from which property owners can determine what the system would cost them in Des Moines, provided proportionate rates are put in force here:

"New England office building, Topeka, 9,298 sq. ft. of radiation, total per annum cost, $1,882.14; cost per square foot, 20 cents.

"Mills Dry Goods Company, Topeka, 12,375 sy. ft. radiation, total per annum cost, $3,033.42; cost per square foot, 24 cents.

"Knights and Ladies of Security Building, Topeka, 3,819 sq. ft. of radiation, total per annum cost, $1,013.69; cost per square foot, 26 cents.

"Public library, Topeka, 2,600 sq. ft. radiation, per annum cost, $541.95; cost per square foot, 20 cents.

"Masonic building, Topeka, 4,500 sq. ft. of radiation, per annum cost for heat, $1,034.50; cost per square foot, 22 cents."

COSTS IN INDIVIDUAL HEATING PLANTS.

For comparisons the committee gives some cost figures on Des Moines buildings on radiation basis. Individual heating plants:

"Cargill Hotel,, 4,194 sq. ft., radiation; per annum cost, $1,545; per square foot radiation, 24 cents.

"Foster Hotel, 4,230 sq. ft. radiation; per annum cost, $1,150; per square foot radiation, 27 cents.

"S. & L. Building, 8,000 sq. ft. radiation; per annum cost, $1,269; per square foot radiation, 15 cents.

"Citizens Bank Building, 5,280 sq. ft. radiation; per annum cost, $2,335; per square foot radiation, 44 cents.

"Shops building, 10,000 sq. ft. radiation; cost per annum, $1,200; per square foot radiation, 12 cents.

"Merchants Transfer Building, 1,900 sq. ft. radiation; cost per annum, $640; per square foot radiation, 23 cents."

"Younker Brothers, 18,000 sq. ft. radiation; per annum cost, $4,262; per square foot radiation, 23 cents."

CUBIC CONTENTS COSTS.

A few figures are given here on cubic feet of contents, cost for comparisons with Des Moines buildings. Central plant heating:

"St. Paul—Finch, Van Slyck & McConville, wholesale dry goods; concrete construction, 755,000 cu. ft., cost per annum, $4,500.

"St. Paul—Davidson office building, steel fireproof, 2,410,800 cu. ft. contents, cost per annum, $4,800.

"Sioux City—Pelletier Department store, 140x150, 65 ft. ceiling heights, per annum cost, $1,500.

"Ottumwa—Offices Merrill Company, wholesale groceries, cu. ft. contents, 14,400, per annum cost, $150.

"Lincoln, Neb.—Commercial Club Building, 532,500 cu. ft. contents, per annum, $900.

"Peoria—Martin Dry Goods, 246,400 cu. ft. contents, per annum cost, $300.

"Cedar Rapids—S. G. Armstrong residence 45x50, two stories and basement, per annum cost, $172."

The committee has detailed information as to heating cost in about 300 buildings of different types and occupancies in twenty cities, together with schedules of rates charged in a dozen or more cities. All of this information is on file at the Chamber of Commerce office and may be examined by any one interested.

Rules for Selecting and Installing Steam Meters.

The unit of measurement for the sale of steam is the pound. Steam meters, measuring the quantity of steam passing into the installation; or condensation meters, measuring the pounds of steam condensed in the installation, may be used. Condensation meters are preferable to steam meters, as they are cheaper, simpler and more reliable. Steam meters, as now on the market, are really flow meters or volume meters, rather than weight meters, and are calibrated in pounds at an assumed pressure.

An acceptable meter should conform to the following :

1. The quantity of steam passing through it should be measured with reasonable reliability and reasonable commercial accuracy under reasonably favorable service conditions.

2. Material and workmanship should be of good quality, and the construction should be durable and rugged and reasonably convenient for installing, reading, inspecting, testing, adjusting and repairing.

3. The mechanism should be protected as far as possible from accidental or intentional interference from outside, and should be arranged to permit sealing.

CONDENSATION METER INSTALLATION REQUIREMENTS.

The size of the meter should be such that the normal load on the meter will be between 25% and 100% of the meter capacity.

The meter should be in an accessible position where it can be read, inspected, tested and repaired at any reasonable time. A meter shall not be located in a pit or other depression, unless the same is amply large for convenient working and is properly drained.

The meter should be set level and upon a solid foundation.

The discharge connection should be tight and should connect with the sewer at a point outside the main house trap (except that this does not apply where water is returned to the heating plant).

SEALING OF VALVES, ETC.

No by-pass to sewer should be permitted in any part of system. Trap should receive all condensation and deliver it to meter.

By-passes and blow-offs should be sealed closed by the heating company and not be opened without knowledge and consent of the company.

INSTALLATION REQUIREMENTS FOR STEAM METERS.

Steam meter installations usually require special specifications for each individual type of meter and each individual installation. Full instructions are usually furnished by the manufacturers. These instructions should be followed out carefully, to ensure satisfactory operation.—*From report of Educational Committee, National District Heating Association.*

The Status of Natural Ventilation.

Taken in connection with the statement of Dr. E. Vernon Hill, of Chicago, in the course of an address before the Buffalo Engineering Society, to the effect that the day of natural ventilation for school buildings is past, the following from a communication of A. A. Packer, which appears in the *American School Board Journal,* is of more than reminiscent interest:

"As one who has given some thought to the question of ventilation, I would like to ask what, if anything, has been the outcome of the Fresh Air Campaign started several years ago by Chicago's official health commissioner, Dr. W. A. Evans.

"Many will remember the series of daily health hints which were contributed through the press by Dr. Evans. They were most exhaustive and complete and finally resulted in the appointment of a municipal ventilation commission which was to study this question and give its conclusions to the public when its investigations were completed.

"Touching briefly on the recommendations made by Dr. Evans, I quote from an article in the Tribune in November, 1911, relative to schoolroom ventilation, in which he says: 'The principal faults of the Chicago practice are the following:

"'1. The temperature is not properly controlled; is not properly observed; is not properly taken; is generally too high.

"'2. The humidity is not properly observed; is generally too low.

"'3. The air in the room is too still.

"'4. The inside walls are too hot; the outside walls and windows are too cold.

"'5. The air as introduced in the room is too hot.

"'6. There is no provision for blowing out the room by putting the windows up.'

"About the same date, Dr. Evans made the following suggestions in connection with the proper system of ventilation for new buildings. 'When new schools are built they should be heated and ventilated along the following lines:

"'1. Radiation placed along the outside walls.

"'2. Air intakes through the walls back of the radiators.

"'3. Air outlets located on the inside wall near the ceiling.

"'4. Outlet ducts in the attice equipped with exhaust fans.

"'5. Provision for discharge into the room of enough saturated steam to maintain the relative humidity at 50 to 75%.

"'6. Provision for enough radiation to keep the room temperature at 68° F., and the temperature of the outside walls high enough to permit of a humidity of 60 to 70%.

"'7. Windows which can be raised.'

"His arguments were convincingly in favor of Natural Ventilation, not only because of the beneficial results upon the health of the school children, but also because of the economies perfected.

"Under the present laws it is stated that 1,800 cu. ft. of air are required for each pupil per hour. Under the system of natural ventilation it was stated that this quantity might be reduced two-thirds, thus affecting a material saving in the amount of fuel required for heating an enormous quantity of air and also accomplishing a saving in the cost of fan installation and maintenance.

"While these views may have been considered more or less radical, from further developments and from the following statements, it would seem that Dr. Evan's position was fully justified.

"The Smithsonian Institution at Washington has just published a 100 page report (Vol. 60, No. 23) on the subject: 'Influence of the Atmosphere on Our Health and Comfort in Confined and Crowded Places.' This covers several years of exhaustive tests and research, the details of which are fully set forth. I here quote briefly from this report. 'The ventilating and heating engineer has hitherto followed a great illusion in thinking that the main objects to be attained in our dwellings and places of business are chemical purity of the air and a uniform, draughtless, summer temperature.

"'Heat stagnation is the one and only cause of the discomfort, and all the symptoms arising in the so-called vitiated atmosphere of crowded rooms are dependent on heat stagnation.

"'The temperature of a schoolroom must be regulated by a thermometer, not by the feelings of the teacher. The reduction in the number of scholars and the periodic emptying and blowing out of the room is the best way of avoiding heat stagnation.

"'We are of the opinion that 60° F., should be the highest temperature tolerated except for the old and infirm. The old should work in a different room and not compel the young to live in rooms heated to a tender-plant temperature.

"We conclude that rooms *should be heated by radiant heat, and ventilated by cool, outside air,* and the conditions of a spring day —sunlight and cool breeze—approximated as nearly as possible. The heated air of rooms is the factor which favors infection and the spread of coryza, influenza, phthisis, etc."

Again, in advocacy of the system of Natural Ventilation, the superintendent of schools of Middletown, Conn., has published in the *School Board Journal,* the following statements:

"'The open-window plan is being tried in all of our thirty-three rooms occupied by over 1,200 pupils. The temperature is kept between 64 and 68°. We have no humidifying apparatus, but trust to the outside air to materially increase the moisture of the air inside. We simply open the windows on one side, if possible two or three sides of the room. Plan would be more successful if window ventilators were used.

"'There have been no complaints. On the other hand, numerous parents have reported *an improved physical condition of their children.* A number of the teachers report they are less exhausted at the close of the school hours and some have actually taken on flesh since the beginning of the school term. A year's trial has demonstrated conclusively that fresher, cooler, moister air is easily obtained and *results in better health and better school work.*'"

Proper Pipe Sizes and Radiation for Heating Systems.

One of the subjects taken up by the Educational Committee, made up of members of the National District Heating Association and of the American Society of Heating and Ventilating Engineers, was the sizing of piping for two-pipe gravity steam and hot-water systems. The matter was referred to a subcommittee, consisting of Edmund F. Capron, J. M. Stannard and L. C. Soule, which has made the following recommendations:

STEAM.

Two-Pipe System—Gravity.

Steam Main, Inches Diameter	Square Feet of Heating Surface	Dry Return, Inches Diameter	Wet Return, Inches Diameter
1	40	¾	¾
1¼	75	1	¾
1½	126	1	1
2	286	1¼	1
2½	535	1½	1
3	890	1½	1
3½	1,360	2	1
4	1,950	2	1
5	3,600	2½	1¼
6	5,900	3	1½
8	12,700	4	2
10	22,900	5	2½
12	37,000	6	3
14	55,300	7	3½
16	78,300	8	4

Hot Water Risers.

Diameter of Riser, Inches	Open Tank System, Square Feet Radiation				Closed Tank Overhead System Drop Risers Not Exceeding Four Floors, Square Feet Radiation
	1st Floor	2d Floor	3d Floor	4th Floor	
1	33	46	57	64	48
1¼	71	104	124	142	112
1½	100	140	175	200	160
2	187	262	325	375	300
2½	292	410	492	580	471
3	500	755	875	1,000	810

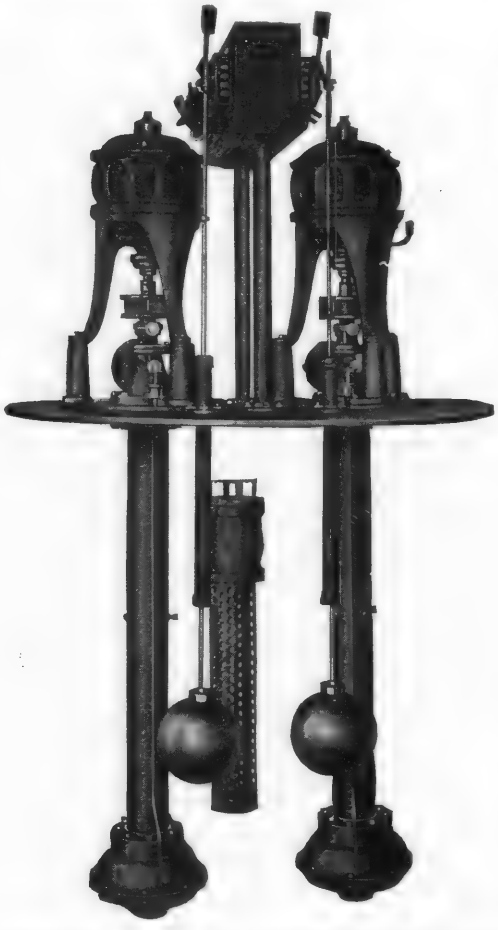
Hot Water Mains.

Diameter of Pipes, Inches	Two Pipe Up Feed Open Tank Direct Radiation, Square Feet	One Pipe Up Feed Open Tank Direct Radiation, Square Feet	Overhead Open Tank Direct Radiation, Square Feet	Overhead Closed Tank Direct Radiation, Square Feet	Two Pipe Open Tank Indirect 12" Above Boiler, Square Feet
1¼	75	45	127	250	48
1½	107	65	181	335	69
2	200	121	339	667	129
2½	314	190	533	1,060	202
3	540	328	916	1,800	348
3½	780	474	1,334	2,600	502
4	1,060	645	1,800	3,350	684
5	1,860	1,130	3,150	6,200	1,200
6	2,960	1,800	5,000	9,800	1,910
8	5,850	3,500	9,900	19,500	3,779
7	4,280	2,700	7,200	13,900	2,769

NEW DEVICES

Submergible-Type Sewage Ejectors.

The accompanying illustration shows interesting features of the Chicago Pump Company's submergible-type duplex sewage ejectors, which are arranged so that the sewage always flows by gravity into the pump chamber, which is of unusually large proportions. From the pump chamber, the sewage is discharged through a discharge pipe and tee on the pump cover to the sewer. The pump is rigidly supported from the cover by a heavy steel tube. Within the center of this tube is a second steel tube which surrounds the pump shaft and bearings, thus protecting them from grit and dirt. The bearings, which are of large proportions, are lubricated by compression grease cups. The weight of the impeller, pump shaft and coupling is carried by a marine-type thrust ball bearing, located just above the discharge tee. This ball bearing revolves between two hardened steel discs, located in a housing filled with grease.

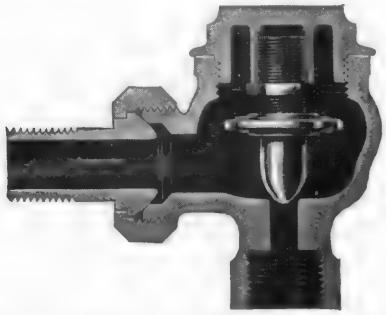


CHICAGO PUMP CO'S SUBMERGIBLE-TYPE DUPLEX SEWAGE EJECTOR.

A point emphasized in the construction of this apparatus is that each ejector is controlled by an independent automatic apparatus, consisting of a double carbon contact float switch, mounted on an iron support on the basin cover, and actuated by a heavy, ribbed copper float through a brass rod which is guided above and below the basin cover. The advantage of having an independent automatic apparatus for each ejector can be appreciated when it is stated that two copper floats actuating two float switches will afford double the protection of one float. In addition, one or both ejectors may be in service at one time, and should one ejector fail or not be capable of handling all the water, there is always an ejector in reserve to take care of the situation and which will start automatically. Attention is also called to the strength of the strainer basket with which this outfit is equipped. This basket is made of heavy steel, galvanized after the holes have been punched through and is considered practically indestructible. A specification folder, fully describing the outfit, is furnished by the Chicago Pump Co., 911 West Lake street, Chicago.

Marsh Reflux Junior Trap.

The increasing use of small traps especially adaptable for small units in steam heating work lends interest to the Marsh Reflux junior



MARSH REFLEX JUNIOR THERMOSTATIC TRAP.

thermostatic trap, which has been placed on the market by James P. Marsh & Co., Chicago, Ill. The principle of construction of this trap is similar to that of the Marsh original reflux trap, and its use is recommended for small radiators and coils, being especially adaptable for two-pipe gravity work and vapor heating systems. It is made en-

tirely of metal, so that there are no parts such as rubber or other composition to deteriorate. The diaphragm is made of phosphor bronze spun directly on the post at the top, making a tight container for the volatile fluids and a sensitive diaphragm and securing automatic action of the trap. A feature of the trap, which, it is stated, is not to be found in any other trap on the market, is a reservoir which is designed to act as a cushion to relieve the force of the expanding member. The reservoir is simply a post with an interior chamber for the expansion of the gases generated in the diaphragm. The upper end being threaded makes it adjustable, so that the diaphragm may be either raised or lowered. It is furnished either with concealed adjustment, as illustrated, or with outside adjustment and is made in ½-in. angle pattern, with brass body, nickel plated. Its capacity is 100 sq. ft. of cast-iron radiation. The trap is listed at $5.

Hutchison Packless Radiator Valves.

A new radiator valve, designed for vapor heating has lately been placed on the market by the Hutchison Vapor Heating Corporation, Herndon, Va. It is known as the Hutchison packless radiator valve. This valve is graduated in such a manner that it may be permanently adjusted to supply any size radiator up to 90 sq. ft. with a pressure of 2 oz. in the system. For permanent regulation the stop bolt in the dial plate is secured at the figure representing the number of square feet

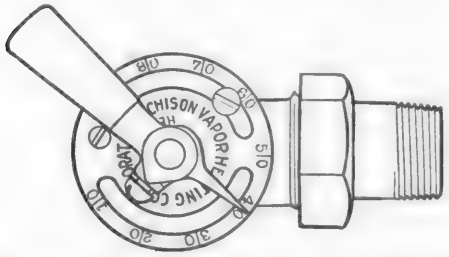
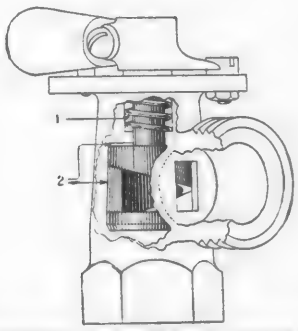


FIG. 1—DIAL PLATE OF HUTCHISON PACKLESS RADIATOR VALVE, SHOWING STOP BOLT.

in the radiator to which it is connected. Temporary regulation is secured by moving the pointer between the stud and stop bolt. Fig. 1 shows the valve adjusted for a 60 sq. ft. radiator, with a temporary regulation of 40 sq. ft.

Another interesting feature of this valve is the tapering slot cut in the key which uncovers a port as the handle is moved, making a quick-opening valve. It will be noted that a spring holds the valve key in position and permits same to be loosened without injury should it stick after long standing. In addition to being self-grinding, the valve is packless and has but one moving part. It is made



HUTCHISON PACKLESS RADIATOR VALVE.

in ¾-in. size, of rough body, nickel-plated, and is fitted with black vulcanized rubber handle, reinforced with brass center bolt. The company also manufactures a line of damper regulators and trap receivers, especially designed for vapor heating. All of the devices mentioned are the inventions of M. Frank Hutchison.

New Book.

OCCUPATIONAL DISEASES, by W. Gilman Thompson, M. D., described as the first practical work covering every disease known to industrial workers, has recently been published by D. Appleton & Co., 35 West 32d Street, New York. The book takes up in detail the causation, relative importance, method of production, pathology, prevention and treatment of occupational diseases, dealing especially with conditions in America, and American statistics have been drawn on to supplement the clinical material.

Since proper air conditions are doing so much to mitigate, if not entirely prevent, many of the occupational diseases, Dr. Thompson's work will be found of special interest and value to ventilating engineers interested in industrial installations. The book includes Dr. Thompson's unique blood pressure tests which were shown to have a bearing on the ventilation problem and which were published in THE HEATING AND VENTILATING MAGAZINE for May and June, 1912. Under "Diseases Due to Harmful Environment" (Part IV), the topics discussed include air modification, temperature modifications, light modifications and electric shock. Cloth, $6.00 net. May be had through the book department of THE HEATING AND VENTILATING MAGAZINE.

Trade Literature.

EXHAUST STEAM HEATING ENCYCLOPEDIA, the third edition of which is being distributed by the Harrison Safety Boiler Works, 3189 North 17th street, Philadelphia, Pa., is a closely-printed volume of over 200 pages replete with photographs and colored diagrams illustrating the Cochrane steam stack and cut-out

valve heater and receiver and its application to commercial exhaust steam heating systems. Of the latter, over thirty are illustrated and the salient or essential features are pointed out. The book also contains interesting chapters on "The Essentials of an Exhaust Steam Heating System," "Exhaust Steam Heating in Connection with Condensing Plants" and "Hot Water Heating from Open Heaters." In the latter, arrangements are shown whereby radiators located above the level of the heater may be supplied without wasting the work involved in lifting the water, also by means of which water at 140° to 160° may be circulated through the heating system, while the heater at the same time is supplying water at 210° or higher, according to the back pressure, for boiler feeding and other purposes, and exhaust steam purified of oil to steam radiators. Another arrangement provides for carrying a vacuum corresponding to the temperature of the water circulated throught the heating system. Fifty-five pages are occupied by tables, information and charts relating to exhaust steam and hot water heating. The book should be of value to owners, architects and engineers wherever power is required in connction with heating service. Size 6x9 in. (standard). Pp. 200.

Pipe Sizes for Central Station Steam and Hot Water Services and House Equipment, consisting of two tables covering hot water radiation from 20 to 160 sq. ft. and steam radiation from 25 to 5,000 sq. ft., have been published in card form by J. C. Hornung, engineer, 111 West Monroe street, Chicago. The reverse sides of the cards are views of equalizing pipe schemes for warming a residence with steam and with hot water.

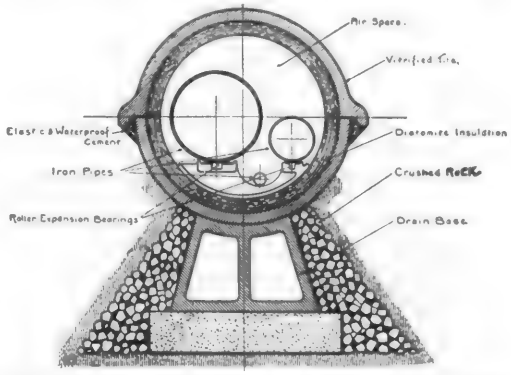
Application of the Electric Hoist, with special reference to industrial plants, is the title of an interesting circular (Bulletin 301A) published by the Pawling & Harnischfeger Co., Milwaukee, Wis. The illustrations show a number of these applications, including a 2-ton hoist for handling pipe. Size 6x9 (standard), punched for binding. Pp. 8.

Leonhard Automatic Air Exhauster, for use in vacuum heating work, is the title of a newly-issued circular describing this unique device in detail. This exhauster, which creates and automatically maintains a vacuum in a steam heating system, is operated by city water pressure. After the vacuum is produced, the water is shut off automatically, restarting when the vacuum diminishes. The catalogue includes a detailed drawing of the device as connected, the various parts being numbered and described in the accompanying text. Size 5¼x7¾ in. Pp. 4.

Foxboro Records, containing in tabloid form, a review of the products of the Industrial Instrument Co., Foxboro, Mass., has lately been issued in folder form, covering the Foxboro indicating and recording thermometers, electric pyrometers, wet and dry bulb recording thermometers, portable and stationary tachometers, mechanical and electrical time recorders, pressure and vacuum gauges, etc. Each device is illustrated and concisely described.

Bristol Recording Differential Pressure Gauges and Recording Flow-Rate Meters, spring and float type, are featured in two catalogues (Bulletins 188 and 189) issued by the Bristol Co., Waterbury, Conn. The spring type pressure gauge is equipped with diaphragm or helical type pressure tube and a patent frictionless sleeve, while the float type uses no springs. These recording differential pressure gauges are particularly useful in connection with orifices, Pitot tubes and Venturi tubes, for measuring and recording rates of flow of air, gas, steam, water and other liquids. Size 8x10½ in. each (standard). Punched for binding. Pp. 8 and 12, respectively.

Ric-Wil Method of modern underground conduit for steam pipes is the subject of a well-designed catalogue published by the Ric-Wil Underground Pipe Covering Co., Cleveland, O. The company states that since the issue of the first edition of this catalogue, the



RIC-WIL METHOD FOR INSULATING MULTIPLE PIPE UNDERGROUND INSTALLATION.

capacity of its factories and annual output have multiplied several fold. After showing the Ric-Wil vitrified tile conduit with interlocking base drain and the Ric-Wil channel type conduit, the catalogue takes up the interlocking base drain in detail, illustrating its construction and uses. An interesting group of Ric-Wil insulated tile fittings are presented on another page of the catalogue. Other portions of the catalogue show typical conduit construction details, with accompanying descriptive matter. Efficiency curves are also

given, backed up by the company's guarantee and graphic illustrations are shown of the mechanical strength of the conduit. Complete list prices and other handy information are included, the whole making one of the most complete catalogues of its kind that has come to our notice. Size 9x6 in. Pp. 40.

AUTOFORCE VENTILATING SYSTEM, devoted to the Autoforce ventilator for buildings, is the subject of a new catalogue devoted largely to typical installations in a variety of buildings. Many of the illustrations are accompanied by impressive testimonials regarding the satisfactory operation of the Autoforce ventilating system as installed. Included in the exhibit is a copy of the certificate of award granted by the Worcester County Mechanics Association "for the excellence of exhibit" of the Autoforce natural ventilation system, "without power, fixed charge, repair bills, etc." Size 8x5¼ in. Pp. 16.

ST. JOHN INDICATING AND RECORDING STEAM METER, manufactured and sold by G. C. St. John, 140 Cedar street, New York, is the subject of a carefully prepared catalogue, in which this instrument and its principle of operation is described at length. It is used for measuring live, exhaust and superheated steam. The text includes a description of the method of calibrating the meters, with a view of the calibrating apparatus, and instructions are given, accompanied by steam data, for measuring steam at any temperature and pressure. Still another portion of the catalogue takes up the operation and care of the meter. Size 6¾x9¾ in. Pp. 32.

Modern Vacuum Cleaning Apparatus

19—Vacuna Portable Turbine Cleaner.

A machine that has attracted considerable attention is the Vacuna Portable turbine vacuum cleaner, which is made entirely of sheet steel, pressed in dies and aluminum castings (internally) which gives it the advantage of lightness, as well as ruggedness. The machine consists of two parts, a dust case and a suction-producing plant. The dust case, which weighs 8 lbs., is separable from the machine itself so that the dirt may be removed from the premises without opening it. The suction-producing apparatus is one complete element pinioned between two ball bearings. It consists of three turbines mounted on the motor shaft. The ball bearings are housed in grease chambers and there are no other points of contact, except the motor brushes between which the commutator revolves. In the alternating current machine there are no brushes.

The principal novelty of the Vacuna machine consists in the multi-stage turbine, each of the stages being larger than the one nearer the air entrance. The complete turbine is housed in a conical enclosure, with an expansion chamber between each turbine stage. Each impeller or stage is so proportioned to the one preceding it that it exhausts air from the expansion chamber more rapidly than the preceding impeller can force it into said expansion chamber, thus eliminating back pressure and increasing the steady flow of air. Special importance is attached by the manufacturers to the amount of air flowing as being the principal element upon which cleaning efficiency depends. The makers state that basic patents on this feature of the machine have been granted in all of the principal countries.

The turbine principle as applied to vacuum cleaners, it is stated, was adopted by the Bureau of Standards of the United States government as being superior to all forms of pump-type or fan-type machines, and it is maintained that the Vacuna machine with its multi-stage turbine has the ability to produce and hold a sufficient

VACUNA PORTABLE TURBINE CLEANER.

vacuum under all sweeping conditions, meaning whether the nozzles are held in contact with or away from the material being cleaned, to do thorough work, at the same time handling large volumes of air. This point is emphasized as making the cleaner a practical sweeping machine for surface litter and coarser dirt, as well as a renovator of carpets, etc.

The Standard Vacuna maintains a vacuum of 1½-in. mercury gauge, whether the nozzle is open or closed. While this

amount of vacuum is considerably less than that maintained in pump-type machines when no air is being moved, attention is called to the fact that 65 cu. ft. of air per minute is displaced by the Vacuna machine while maintaining the constant vacuum.

For the dust bag a heavy rough material is used, twill woven, a material that has been found not to clog or to sift dirt. The portability of the machine is enhanced by its large casters, of special design, which are ball-bearing and rubber-tired.

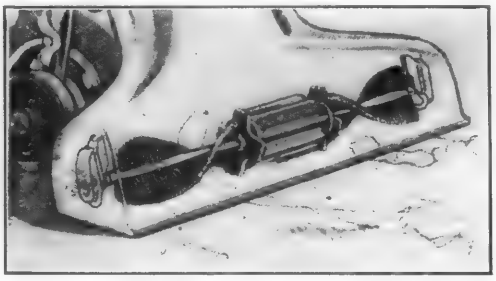
The machine complete weighs 50 lbs. in all—lower half with motor, 40 lbs.; upper half, 10 lbs.

It is of interest to note that the name Vacuna is that of the Goddess of Leisure whom the Romans worshipped at the close of harvests and to whom they brought tithes and offerings from the crops just gathered, before entering upon a period of rest and leisure.

The machine is made and sold by the Vacuna Sales Co., 251 Fifth Avenue, New York.

Vacuum Cleaner Nozzle with Enclosed Brush.

A recent patent for a vacuum cleaner nozzle provides for a revolving brush close to the inlet which is used to assist in raising



ARRANGEMENT OF BRUSH INSIDE OF VACUUM CLEANING NOZZLE.

the dust particles, lint, thread, etc., so that they may be more easily taken up through the nozzle. This device is described in *Popular Mechanics* from which the accompanying illustration is taken.

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TRADE AND MISCELLANEOUS NOTES

Deaths.

Frank L. Busey, research and engineering expert, of the Buffalo Forge Co., Buffalo, N. Y., died June 7 at the Battle Creek Sanitarium of spinal meningitis. Mr. Busey had not been well for some time and had gone to Battle Creek to recuperate. Although connected with the heating trade a comparatively short time, Mr. Busey had won a host of friends and had made an enviable name for himself as one of the most capable and progressive engineers in the heating profession. Mr. Busey was 42 years old. He was born in Urbana, Ill., and was a graduate of the University of Illinois. Some of Mr. Busey's most important work was done as assistant mechanical engineer at the University of Illinois experiment station, where he had charge of the fuel test division. He became associated with the Buffalo Forge Company three years ago, where he undertook, in company with Willis H. Carrier, a number of important tests on fans and other heating and ventilating apparatus. Mr. Busey was a member of The American Society of Heating and Ventilating Engineers and of The American Society of Mechanical Engineers. He was a Mason and was a member of the Mystic Shrine. He leaves a widow.

Henry Wallis McMann, a member of the firm of McMann & Taylor, New York, dealers in pipe and fittings, died May 29 at his home in Englewood, N. J., from a complication of diseases. He was 68 years old. Mr. McMann had been a figure in the pipe and fittings trade since 1862, the original firm name being Norris, King & McMann. The business was then located at 58-60 Gold Street. Later the firm name was changed to McMann & Russell and subsequently to T. R. McMann & Brother. The name of McMann & Taylor was adopted in 1893, the firm then being composed of Mr. Henry W. McMann and George W. K. Taylor, formerly of Eaton, Cole & Burnham Co. Mr. McMann retired from active business in 1909. He leaves a widow, one son, James R. McMann and one daughter.

George W. Nistle, one of the founders and vice-president of the Illinois Engineering Co., Chicago, died suddenly May 27. He was 60 years old.

Miscellaneous Notes.

North Yakima, Wash.—The conference between the city commission and representatives of the Central Heating Company in regard to a franchise to furnish light and heat in competition with the Pacific Power & Light Company resulted in a decision by the commission not to indorse the company's application. The proposition will, therefore, be submitted to the vote of the people. The company was willing to pay one-half of 1% of its net earnings to the city, while the commission asked nothing during the first five years, but one-half of 1% during each of 10 years thereafter and 1% during each of the last 15 years of the contract. The commissioners required a clause providing for the forfeiture of the contract if sold to a rival company, and to this the company would

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PIPE CUTTERS

PIPE MACHINES, HAND OR POWER

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not agree. If the city took the company's lighting system at a valuation fixed by law, the company required that it also take the gas plant and to this the city would not agree. One of the commissioners expressed the sentiment that he might take a different view if he did not believe the heating company was in the market with the franchise.

Fremont, Neb.—Fremont, a city of 10,000 inhabitants, will probably have a new municipal heating plant, if it costs $40,000 to equip it. A committee, composed of city officials, recently inspected the Sioux City Service Company's plant, and other plants will be visited before the matter is finally decided. The committee is composed of John Martin, president of the city council, chairman; F. M. Thompson, a councilman; L. D. Wright, of the water and light commission; and John Gumt, of the board of public works.

Milwaukee, Wis.—Plans for the $100,000 power plant, heating and lighting system and sewage plant for the Milwaukee County Tubercular Sanitarium have been started, the architects being R. Messmer & Bros.

Conneaut, O.—The city council is considering a proposition to install a municipal steam-heating plant to furnish heat to both the business and residence sections of the city.

Tacoma, Wash.—One hundred and sixty-eight petitions demanding a referendum vote on the heating franchise awarded by the old city council to the Tacoma Central Heating Company, which plans to spend $325,000 on a heating plant in that city, have been filed by members of the Tacoma branch of the National Association of Stationary Engineers. The petitions contain 3,823 names, about 1,300 more than required by law. The council has authority to either revoke the franchise or call a special election, the expenses to be borne by the heating company. It is stated that the company will not put up the money to fight the petitions. The engineers object to the plant on the ground that it ought to be built by the city.

Anderson, Ind.—A petition has been presented to the board of public works by Ernest N. Hill, asking that an engineer be appointed to report on the advisability of the city purchasing the heating plant. It is claimed that the city could sell exhaust steam from the light plant and water works, which is not being done at present. It is proposed to connect the two plants with a steam line that can be used either

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- ¶ **No leaky Radiator valves.**
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THE BISHOP-BABCOCK-BECKER CO. **CLEVELAND, O.**

for conducting live steam from the heating plant in case of a breakdown or for exhaust steam from the city plant to the heating mains.

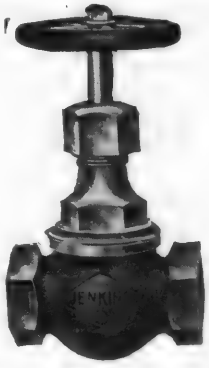
Bay City, Mich.—A curious situation in the heating and plumbing business in Bay City has resulted from the duties placed upon the plumbing inspector by the city charter. Where there is heating work to be done in connection with plumbing jobs, the duties of the plumbing inspector, it is claimed, offer an unfair business advantage in that he is virtually invited and given a chance to compete while the other heating concerns have to ferret out the opportunities for themselves. The matter came up through the fact that Plumbing Inspector J. P. Friend is in the heating business. Seventeen contractors have petitioned the city council that the board of health be instructed to tell the inspector either to discontinue his heating business or resign. It is not claimed that any unfair advantage has been taken by the inspector, but that the opportunity of his position in this connection should not be permitted to exist.

Fall River, Mass.—A new heating and lighting plant, to cost from $15,000 to $16,000, will be installed at the central post-office building in Fall River. The present hot-water heating system, supplemented by a hot-air system, will be supplanted by a direct steam-heating plant.

Virginia, Minn.—A municipally-owned heating plant, to cost about $75,000, will be built in Virginia this year, if the plans outlined by Mayor Boylan at a special meeting of the city council are carried out. A municipal gas plant is also proposed.

Menominee, Mich.—Plans have been drawn by the Foster Construction Company for a separate building to house the heating plant for the opera house to be constructed at Escanaba for John A. Semer. The plant will be built on a lot owned by John Semer, west of the theatre site, and will be of sufficient size to furnish heat to several of the surrounding buildings.

Saginaw, Mich.—Work has commenced on the installation in Saginaw of the central station heating system for which the people voted a franchise a year ago to Herbert F. Wills, of Logansport, Ind. The first excavations for the underground mains were made at Janes and Baum Streets, where the plant will be located. The trunk lines from the plant will be 16 in. in diameter, and the principal one will run east on Janes Street from the plant to Jefferson Avenue, north on Jefferson Avenue to Genesee Street and west on Genesee to Washington Street. The general contract for the underground construction work is held by the American District Steam Company, North Tonawanda, N. Y. J. D. Harris, formerly manager of the People's Heat & Light Company, Indianapolis, Ind., is in direct charge of the work. Temporary quarters of the Saginaw Heating Company have been opened at 413½ Genesee Avenue. According to the terms of the franchise, the plant must be completed by September next. Owing to the delay in starting the



Specify Valves by the Diamond Trade Mark

Because on any valve it means absolute satisfaction, replacement, or money back. It is the mark which enables you to distinguish the *genuine Jenkins Bros. Valves*, known the world over as being the most reliable. All good kinds for all conditions of service. Write for handy catalogue.

JENKINS BROS.

New York Boston Philadelphia Chicago Montreal London

SPECIFY FOXBORO THERMOMETERS

TRADE MARK

THE LATEST AND BEST BY EVERY TEST Send for Bulletin No. 73

New York 50 Church St. **The Industrial Instrument Co., Foxboro, Mass.** Chicago Monadnock Bldg.

Please mention THE HEATING AND VENTILATING MAGAZINE *when you write.*

work, it is feared that some of the heat subscribers or those intending to subscribe will postpone too long the work of laying their house or building connections, and Manager Harris has urged prompt action to prevent the local heating contractors from being overwhelmed with work the latter part of the summer.

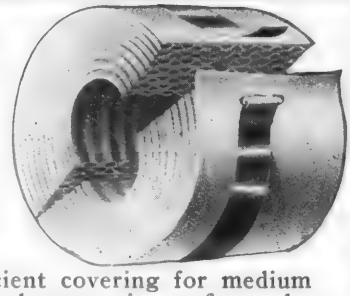
Des Moines, Ia.—A favorable report on the proposition of having a central station heating plant in Des Moines was presented to the Chamber of Commerce recently by the special committee appointed to investigate the matter. The ordinance submitted by the McKinley interests for a franchise to operate a central heating plant in the city was read, which proposes to give the Des Moines Electric Company the right to construct and operate the system for a term of 25 years. Objection was made by local business men to two sections of the franchise. The price for heat established by the franchise was considered by some to be too high. These prices range from $1.00 per 1,000 lbs. for the first 10,000 lbs. of steam or less consumed during any month, to 50 cents per 1,000 lbs. for all over 600,000 lbs. used during any one month. A discount of 5% on all bills paid before the fifteenth of the month is proposed. Objection was also made to the section that gives the company the right to establish rules and regulations as to the amount of piping, radiation and other apparatus to be installed in the buildings. Details of the committee's report will be found on another page of this issue.

Des Moines, Ia.—Indictments against 36 officials of the National Association of Master Plumbers and the officials of State organizations in Illinois, Wisconsin, Michigan, Minnesota, Missouri and Iowa have been returned by the Federal Grand Jury in Des Moines, charging restraint of trade as the result of an agreement between the master plumbers' association and the supply trade, to confine the sale of plumbing supplies to persons legitimately engaged in the business or master plumbers. The association passed a resolution in 1903 defining a master plumber as a member of the master plumbers' association. Those indicted are:

Illinois—Wm. J. Hilliard, Elmhurst, past-president and director state association; W. C. Haviland, Aurora, secretary state association; Frank M. Patterson, Springfield, past-president and director state association.

Indiana—Wm. J. Woolley, president state

Your Clients' Houses Can be Heated at a Saving of 20 to 30%



Engineering tests prove that, at $4.00 a ton, it costs $154.00 a year for coal to deliver steam through 500 sq. ft. of pipe covered with ordinary air-cell covering; whereas the same heating effect can be produced for $113.50 (a saving of nearly 26%) where the pipes are insulated with J-M Asbestocel Pipe Covering.

This is universally acknowledged to be the most efficient covering for medium or low pressure steam and hot water heating systems because it confines the largest amount of "dead air." And "dead air" is the greatest known insulator.

J-M ASBESTOCEL PIPE COVERING

is made of corrugated asbestos felt built up on the arch principle—see illustration. The air-cells run **around** the pipe, forming a series of **sealed rings** of "dead air." In ordinary air-cell coverings the air cells run **lengthwise,** allowing free circulation of air and consequent radiation of heat.

This arch construction also makes J-M Asbestocel stronger than other coverings. It will not break or crush down under weight and successfully withstands vibration and hard usage. Can be removed and replaced without injury.

This pipe covering offers you a splendid opportunity to reap big profits not only on new piping contracts, but also from hundreds of jobs in old buildings around your city.

Write our nearest branch for sample and booklet

H. W. JOHNS-MANVILLE CO.

Albany, Baltimore, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Dallas, Detroit, Indianapolis, Kansas City, Los Angeles, Louisville, Milwaukee, Minneapolis, New Orleans, New York, Omaha, Philadelphia, Pittsburgh, SanFrancisco, Seattle, St. Louis, Syracuse1915

Detroit Packless Valves are insurance

Since the first radiator valve was brought out over thirty-five years ago, until recently, the only protection against leaking radiator valves has been some loose asbestos string packing or oil-soaked wicking wound around the handle stem and retained in a stuffing box by an ordinary packing nut.

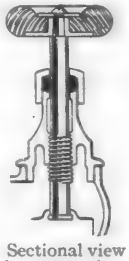
Always this packing has been the source of trouble, annoyance and expense.

Heat dries it up, turning the handle wears it out and disintegration is rapid.

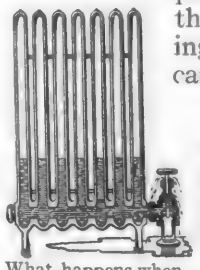
Sooner or later the radiator is bound to fill with water—probably at night. When it does, the water will leak out between the stem and the packing.

So frequently does this occur that it is exceptional to find an installation of radiator valves of the packed type where leaking water has not done some damage.

Stained and discolored walls and ceilings, loose plaster, spoiled floors, rugs, furniture and decorations—are some of the most common evidences of the use of the packed type of valve.



Sectional view of stuffing box on an ordinary packed radiator valve.



What happens when a radiator with a leaky valve fills with water.

Detroit Packless Radiator Valves are positive insurance against such troubles.

They are tight—absolutely, and they stay tight. They will not leak under any circumstances.

Their first cost is the whole cost. They do not have to be repacked at frequent intervals at considerable expense for labor, and in large buildings there is no necessity of a man devoting a large part of his time to their care.

Their installation represents an investment that pays big dividends—to every one involved—dividends in satisfaction, in freedom from annoyance and in money saved.

DETROIT LUBRICATOR COMPANY

DETROIT, U. S. A.

Complete information on the subject of radiator valves will be gladly sent upon request. Ask for booklet V-46.

association, and director of national association.

Iowa.—John R. King, Keokuk, president state association; Robert Knauer, Des Moines, national state vice-president; R. F. Knauer, Boone, former state organizer; H. B. McCarten, past state president, and Richard Mullen, Dubuque; J. O. McConnell, Iowa City; James A. Wallace, Des Moines; Charles G. Bosch, Burlington; Fred Kubias and Louis Smid, Cedar Rapids; Ambrose Clayton, Davenport; W. C. McCarten and E. F. Hawk, Marshalltown; John F. Garvey and Thomas J. Daly, Mason City; V. J. Hagen and John F. Gearen, Sioux City; Ralph A. Ellis, Waterloo; William Scott, Oelwein; Hugo W. Kuyper, Pella.

Nebraska—Joseph G. Bixby, Omaha, past state president and national state vice-president; George H. Wentz, Lincoln, past state president; J. B. Coningham, Omaha, secretary state association.

Missouri—E. D. Hornbrook, past national president and director national association; J. P. Cunningham and E. O. Wilkerson, all of Kansas City.

Wisconsin—George F. Reeke, Green Bay, past state president; Louis Sonntag, Sheboygan, secretary state association; James A. Trane, La Crosse, president local association; Henry H. Niebuhr, La Crosse.

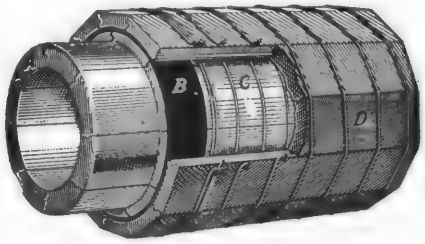
Michigan—William A. Decker, Grand Rapids, national state vice-president and secretary-treasurer state association.

Minnesota—Wm. W. Hughes, Minneapolis, director national association and president state association.

The case will come up before the Federal Grand Jury at Salt Lake City in July, and the inquiry will then be continued in Philadelphia. B. F. Wellty, special assistant to the attorney-general, is in charge of the case. Among the witnesses questioned by the grand jury were William E. Scott and Charles W. Light, head of the Eureka Heating & Ventilating Co., both of Saginaw, Mich. Mr. Light was ordered to bring letters from manufacturers of plumbing supplies in which they refused to quote him prices or sell him goods because he was not a member of the National Association of Master Plumbers.

Dr. E. Vernon Hill, director of ventilation for the Chicago health department, was the principal speaker at the annual banquet and election of the Buffalo Engineering Society, held in Buffalo, N. Y., May 8. His subject was "Standards of Ventilation."

Clarence M. Woolley, president of the American Radiator Company, is in Europe, where he went in company with J. D.



A—Inner Shell, 2 inches thick.
B—Asphaltum Packing.
C—Dead Air Space.
D—Outer Shell, 1 inch thick.

Cover Your Steam Pipes

WITH WYCKOFF'S IMPROVED

CYPRESS COVERING

Made of Gulf Cypress, the wood eternal

Not affected by wet and dry conditions common to steampipe trenches. Will not rot. Lasts twice as long as Pine Casing. Absolutely water and steam tight. Each shell is wound with heavy galvanized wire. Coated all over with the best known preservative—Hydrolene B.

Let us answer your questions and tell you all about it. Booklet on request.

A. WYCKOFF & SON COMPANY

ELMIRA . . N. Y.

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8 BIG

Sirocco

TRADE MARK.

Cooling, Purifying and Humidifying Outfits

are being installed in The Ford Company's new 800 ft. factory addition to their already mammoth plant. The 8 "Sirocco" Outfits will deliver 464,000 cubic feet of perfectly pure air into this enormous plant every minute.

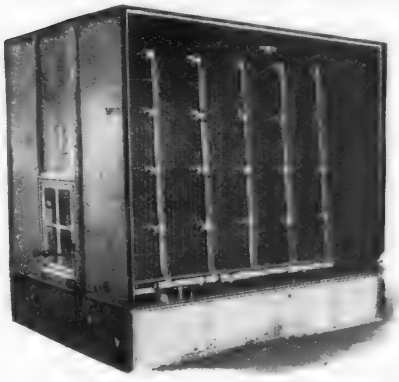
The highest possible standard of atmospheric comfort and purity is the demands of this company and they'll get it **with Sirocco.** All dirt—dust and impurities are washed out of the properly heated air before it is delivered into the workrooms.

Not one square inch of floor space is used by this entire equipment. Everything is **on the roof.**

The Ford Company—the keenest buyers in the country, selected "Sirocco" **strictly on merit.**

What Sirocco Equipment is **doing** for others—is a good standard upon which to base **your** decision.

Upon request we'll gladly send to you a complete description of this installation. Ask for Bulletin No. 2309.



AMERICAN BLOWER COMPANY

DETROIT, MICHIGAN, U.S.A.

BRANCH OFFICES

New York, 141 Broadway.
Rochester, Insurance Bldg.
Philadelphia, 605 Hale Bldg.
Pittsburgh, Empire Bldg.
Chicago, Marquette Bldg.
St. Louis, Title Guaranty Bldg.
Atlanta, Empire Bldg.
Minneapolis, Plymouth Bldg.
Kansas City, R. A. Long Bldg.
Seattle, 538 Central Bldg.
Los Angeles, Central Bldg.
Indianapolis, 705 Merchants' Nat. Bk. Bldg.
Boston, 120 Milk Street.
San Francisco, Rialto Bldg.

Canadian Sirocco Co., Ltd., Windsor, Ont., Manufacturers for Canada.

Erskine, eastern sales manager. Mr. Erskine returned in June, and Mr. Woolley will remain abroad until Fall.

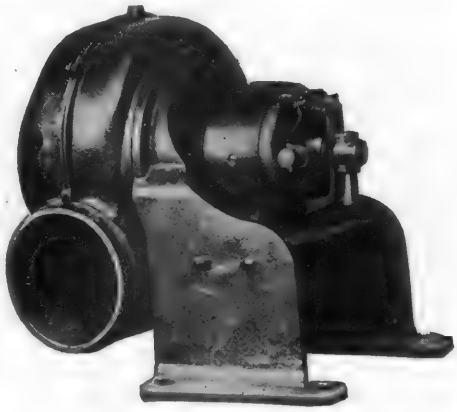
National Boiler and Radiators' Manufacturers' Association, at its annual meeting, held June 8 in New York, re-elected its officers as follows: President, P. M. Beecher, Pierce, Butler & Pierce Mfg. Co., Syracuse, N. Y.; vice-president, Harry T. Cole, United States Radiator Corporation, Detroit, Mich.; secretary, William Ritchie, Boynton Furnace Co., New York.

William Ritchie, secretary of the Boynton Furnace Co., New York, received the congratulations of his friends on his marriage May 28 in New York. Mr. and Mrs. Ritchie are spending their honeymoon in Europe.

Boston, Mass.—An opinion filed by Attorney-General Thomas J. Boynton declares that a pending bill in the Massachusetts senate prohibiting insurance of plumbing permits to any but master plumbers would, if enacted, be unconstitutional, the evident aim of the bill being to create a class within a class. The senate rejected the bill without debate.

Eastern Supply Association, at its midsummer meeting in Atlantic City, June 9, was addressed by Daniel L. Van Hee, Samuel Sloan & Co., Rochester, N. Y., on "The Credit Man and His Work," and by A. M. Maddock, Thos. Maddock Sons Co., Trenton, N. J., on "The Making of Sanitary Fixtures by the Potter." On the matter of freight allowances, the association passed a resolution that manufacturers be requested to refrain from allowing freight on direct shipments. It was announced that the board of directors of the association had approved a recommendation of the committee of the Chamber of Commerce of the United States that an interstate trade commission should be established, to consist of at least five members to be appointed by the President, and that the jurisdiction of the commission in conducting investigations extend to all corporations engaged in interstate or foreign commerce, except such as are amenable to the Interstate Commerce Commission. A mail ballot has been sent to the members on this proposition. The work of the One Cent Letter Postage Association was endorsed at the meeting. Among the firms admitted to membership are Fee & Mason, New York; Lee Valley, McLeod, Kincaid Co., Elmira, N. Y.; Neser & Quinn Co., Baltimore, Md., and W. A. Weiskittel & Sons, Baltimore, Md.

Central Supply Association met June 17 at the quarters of the Detroit Board of Commerce. Following a business session



Westinghouse-Sirocco Blowers

are especially designed for forcing air through pipes or against resistance to its passage.

Many ventilating problems can be easily solved by means of these little blowers.

They are compact, easily installed, quiet in operation, and very efficient.

The blower wheel is of the well-known Sirocco design and construction and is able to handle large volumes of air at considerable pressure.

Made in sizes of from 175 to 700 cubic feet of air per minute. Send for publication giving full description, dimensions and prices.

Westinghouse Electric & Manufacturing Co.,
East Pittsburgh, Pa.

Essential in all Well-ventilated Buildings

A well-ventilated telephone booth is appreciated by all and a refreshing coolness is noticed immediately upon entering the booth. A ventilated booth is the earmark of a building that is efficiently ventilated in every particular.

Ventilating specifications should provide for the ventilation of the telephone booth in the same way as for the smoking room.

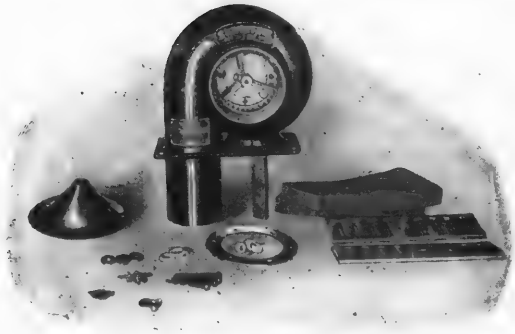
Sturtevant
(REG. U. S. PAT. OFF.)

Telephone Booth Ventilator

floods the booth with a continual supply of pure fresh air. It removes smoke and disagreeable odors and gives added comfort while telephoning. Such hotels as the Ritz-Carlton in New York, the Brevoort in Chicago, and the Lafayette in Buffalo have adopted the Sturtevant Telephone Booth Ventilator.

Draw up your specifications to read "Telephone Booth to be equipped with the Sturtevant Ventilator."

Bulletin RRTV-1008 describes "A Cooler Booth." Let us send you a copy.



B. F. Sturtevant Co.
Hyde Park, Boston, Mass.

and all principal cities of the world

in the morning, the members and guests spent the afternoon on the Detroit River, inspecting the work done by the Government in making a 22-ft. channel through that hitherto dangerous section of the river. The association endorsed the stand taken by manufacturers of enameled iron ware that on and after July 15 the manufacture of "seconds" be absolutely discontinued. A resolution was also passed bearing on certain paragraphs of the Clayton anti-trust bill in which it appeared to both the committee and the association that certain classes of citizens would be excepted from the operation of this measure. The resolution urged every member to oppose this section of the bill.

Newton L. Schloss, New York, mechanical and electrical expert for the design and supervision of heating, ventilating, lighting, power and refrigerating systems, announces the removal of his offices to 25 West 32nd Street.

W. H. Smead, mechanical engineer, Cleveland, O., who recently opened an office at 1028 Citizens Building, announces that he is prepared to handle general engineering work, especially power plant equipment and forced hot water heating systems.

Manufacturing Notes.

Lord & Burnham Co., Irvington, N. Y., announces the appointment of H. M. Grossman to a position in the boiler department of the company and will be located in Philadelphia. Mr. Grossman formerly represented the Pierce, Butler & Pierce Mfg. Company.

Honeywell Heating Specialty Co., Wabash, Ind., is building an addition to its plant in Wabash to be devoted to the manufacture of the company's line of temperature regulators.

Lavigne Mfg. Co., Detroit, Mich., announces the appointment of H. R. Watson, formerly of the United States Radiator Corporation, as its Eastern sales manager, with headquarters in the World Tower Building, 110 West 40th Street, New York. Mr. Watson will handle the company's extensive line of radiator valves, for steam and hot water heating systems in the metropolitan district.

Jeffery Hydro Mfg. Co., Cleveland, O., is the changed name of the Hydro Pneumatic Cleaner Co., of that city. The company's general offices have been moved to 624 Columbia Building.

H. W. Johns-Manville Co., New York, announces that its Duluth branch has taken larger quarters at 327 West First Street, in order to take care of its increased business. The new office is on the ground floor, where the display includes J.-M. asbestos roofing, pipe coverings, packings, etc.

Buffalo Forge Co., Buffalo, N. Y., reports, among recent orders, one for two No. 11 Niagara Conoidal fans for the Los Angeles Athletic Club Building, which is the finest of its kind in the West. This order is part of the second ventilating contract, the first having included three large Buffalo fans.

Business Troubles.

Ventilating Systems Co., New York, has filed a petition in bankruptcy, with liabilities of $104,300 and assets of $10,233. The company was incorporated in 1911 with a capital stock of $100,000 to manufacture a line of window ventilators containing small blowers for creating positive air currents. The principal creditor is George H. Bowers of Westfield, N. J., whose claim is $102,468 for money loaned and merchandise sold.

New Incorporations.

Electric Light & Heating Controller Co., Johnstown, Pa., capital, $50,000; to manufacture automatic damper adjusters. Incorporators: P. Lawson, J. E. Zang and H. H. Hoffman, all of Johnstown.

Farwell Heating & Engineering Co., Joplin, Mo., capital, $5,000. Incorporators: M. A. Ellsner, R. M. Sheppard and C. T. Craig.

Jackson Plumbing & Heating Co., Boston, Mass., capital, $10,000. Incorporators: Frederick A. Jackson, Ernest G. Chute and Percy R. Winters.

Automatic Vacuum Exhauster and Heating Co., St. Louis, Mo., capital stock, $50,000; to deal in vacuum heating specialties. Incorporators: Frederick E. Siebenmann, William C. McNutt, John R. Clancy and William F. Fahey.

Economy Furnace & Heater Co., Wellston, O., capital, $30,000; to manufacture heaters. Incorporators: J. H. Sellers, L. U. Vogelsong, E. H. Willis, J. H. Browne and C. N. Fitzpatrick.

A. C. Flynn Heating Co., Chicago, capital, $2,500; to engage in a heating contracting business. Incorporators: Adrian C. Flynn, Gerald F. Mooney and Philip J. Godfrey.

Thomas E. O'Brien Co., Brooklyn, N. Y., capital, $25,000; to conduct a heating and plumbing business. Incorporators: Thomas E. O'Brien and J. J. O'Brien.

Admiral Automatic Heater Co., Los Angeles, Cal., capital, $25,000. Incorporators: I. F. Jones, Maurice J. Dewey, Frank Cavenogh and others.

Craven Steam Boiler Works, Brooklyn, N. Y., capital, $5,000. Incorporators: T. J.

Craven, Annie Craven and J. F. Craven.

Charles A. Honold Co., Sheboygan, Wis., capital, $25,000; to take over heating and plumbing business of Charles A. Honold. Incorporators: Charles A. Honold, Fred Rankal and B. C. Heinzen.

Jedlicka Bros. Co., Inc., Sayville, N. Y., capital, $40,000; to conduct a heating and plumbing contracting business. Incorporators: T. Jedlicka, J. J. Jedlicka and E. F. Jedlicka.

Pancoast Mfg. Co., Wilmington, Del., capital, $200,000; to manufacture ventilators and other devices. Incorporators: L. A. Bownhill, I. T. Conway and M. E. Dorsey.

Hutchinson Vapor Heating Co., Herndon, Va., capital, $10,000; to manufacture vapor heating devices. President, W. S. Halliwell; secretary and treasurer, C. N. Florence. Incorporators: James T. Hutchinson, Wendell J. Wright and M. L. O'Brien.

Daly Plumbing Co., Bakersfield, Cal., capital, $10,000; to conduct a heating and plumbing business. Incorporators: M. S. Platz, Charles and Beulah Daly.

Western Heating Co., Los Angeles, Cal., capital, $50,000; to conduct a heating contracting business. Incorporators: E. W. Daily, J. W. Smith and F. C. Peters.

Rector Sanitary Co., Louisville, Ky., capital, $75,000; to manufacture heating goods. Incorporators: H. V. Bomar, T. R. Jackson and Paul P. Gaylord.

Economy Furnace & Heater Co., Wellston, O., capital, $30,000. Incorporators: J. H. Sellers, L. U. Vogelsang, E. H. Willis, J. H. Browne and C. E. Fitzpatrick.

Fish, Burns & Fish, Alton, N. Y., capital, $60,000; to conduct a heating, plumbing and hardware business. Incorporators: O. L. Fish and W. Z. Fish, of Williamson, N. Y.; and C. F. Burns, of Alton.

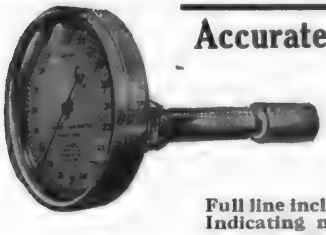
McDonald & Johns Co., Cleveland, O., capital, $10,000; to manufacture heating specialties. Incorporators: J. J. McDonald, George A. Johns, Thomas Graves and J. Reeves, all of Cleveland. The company has opened offices at 1924 Prospect Avenue.

I. L. Lewis Mfg. Co., Syracuse, N. Y., capital, $50,000; to manufacture heating and plumbing specialties. Incorporators: I. L. Lewis, Syracuse; V. S. Lounsbury and W. E. Lounsbury, Oneida, N. Y.

Contracts Awarded.

Nevada Plumbing & Heating Co., Toledo, Ia., heating, ventilating and plumbing Toledo high school building for $13,681.

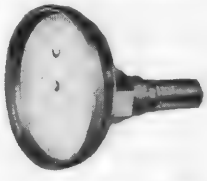
Capp Plumbing & Electric Co., Rushville, Ind., were low bidders for the heating, plumbing and wiring of the six new buildings for the Indiana Village for Epi-



Accurate Service Is Assured When You Use

Standard Indicating and Recording Thermometers

Guaranteed Correct



Full line includes seven types of recording thermometers and a special line for mechanical uses. Indicating mechanical thermometers are furnished with extensions from 2 to 30 in. in length.

All thermometers are double and not breakable.

STANDARD THERMOMETER COMPANY Clinton and Shirley Streets **BOSTON, MASS.**

The President of a large Brewery writes:—

"Ric-wiL Method More Than Pays For Itself"

And further regarding installation at his plant—"This pipe is laid three feet under the surface, and with the old method of protection, gave us a great deal of trouble in winter time by thawing the snow above it even in the coldest of weather, thereby, always destroying the sleigh-road in our busy brewery yard, on which sleighing we have to depend generally for about three months of the year.

"The application of the Ric-wiL covering has completely done away with the trouble, so that now no signs in the snow are discovered to even tell us where the pipe is located."

Ric-wiL Method of Insulating Underground Pipes—Satisfies He Who Buys

Data on Installation—yours for the asking

623 New England Building **The Ric-wiL Underground Pipe Covering Co.** Cleveland, Ohio

Please mention THE HEATING AND VENTILATING MAGAZINE *when you write.*

leptics near Newcastle. The buildings will cost $84,000 and will accommodate 105 patients.

Peck-Anderson & Peck Co., Cincinnati, Ohio, heating addition to the Union Savings Bank and Trust Company on Fourth Street.

Marine Boiler Works, Toledo, O., installing four marine boilers of the Scotch type in the Don Juan de Austria, the training ship for the Michigan naval militia.

Carson Payton Co., Champaign, Ill., heating and plumbing new high school building at Champaign for $42,822; also heating and plumbing new high school at Urbana, Ill., for $36,000.

M. D. Holmes & Son, Worcester, Mass., heating new training school at Oakdale.

Jacksonville Plumbing & Heating Co., Jacksonville, Ill., heating, ventilating and plumbing new school building at that place, for $11,000.

Cain & Bell, Fredericksburg, Va., heating, plumbing and lighting new dormitory at the State Normal School.

Parks Heating and Plumbing Co., South Omaha, Neb., heating and plumbing State School for the Deaf at Omaha for $6,716.

Peter Johnson & Co., Collinsville, Ind., steam heating and plumbing in addition to Webster School at that place, for $4,371.

J. Frank Boyer Plumbing & Heating Co., Norristown, Pa., heating and plumbing new school building at Markley and James Streets, for $11,000.

Lamneck Heating Co., Columbus, O., heating, and ventilating new school building at Alliance, O.

J. Carl Thayer, Fresno, Cal., heating and ventilating new school building in Corcoran, Cal., for $3,000.

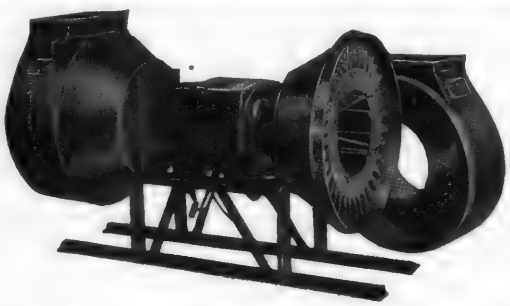
Huffman & Conklin Co., Columbus, O., heating, ventilating and plumbing new infirmary building at Paulding, O.

Milner-Bill Co., Springfield, Mass., heating and ventilating addition to the Brightwood School, at Springfield, for $1,990. Other bidders were: Fred C. McLean, $2,796; J. J. Cotter Co., $2,145; Wyckoff & Lloyd Co., $2,168.

Kuhnly Plumbing & Heating Co., Norwich, Conn., heating and plumbing new parochial school building for St. Joseph's Church at Norwich.

J. E. O'Mara, San Francisco, Cal., heating and ventilating Cooper School building in San Francisco, for $4,432; the plumbing contract went to H. Lawson, at his bid of $6,865.

A. Hattersley & Sons, Fort Wayne, Ind., heating and plumbing new $150,000 Harmer School building in Fort Wayne.



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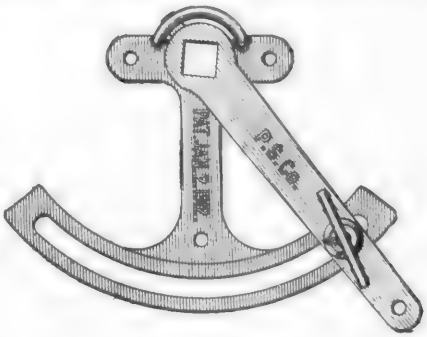

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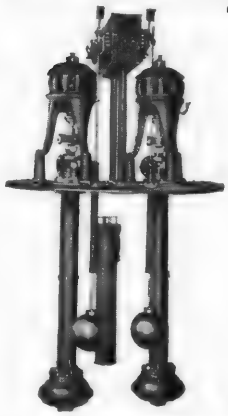

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B. O. Daubert, Norfolk, Neb., heating, ventilating and plumbing two new schools in Norfolk for $8,000.

Columbus Heating & Ventilating Co., Columbus, O., heating and ventilating new high school in Pomeroy, O.

McGinness-Smith Co., Pittsburgh, Pa., steam heating new warehouse for the McKinney Mfg. Co.

Sanitary Supply Co., Madison, Wis., heating, ventilating and plumbing new high school building at Madison for $7,325.

Jacob Meyer, Reno, Nev., heating and ventilating Modoc County Courthouse, for $7,596.

Phoenix Machinery & Electrical Co., Phoenix, Ariz., heating and ventilating Industrial Art Building for the Normal College at Phoenix; the plumbing contract went to the Valley Hdwe. & Plumbing Co.

James H. Merritt, New York, heating and ventilating new additions to the county buildings at Mineola, L. I., for $10,580.

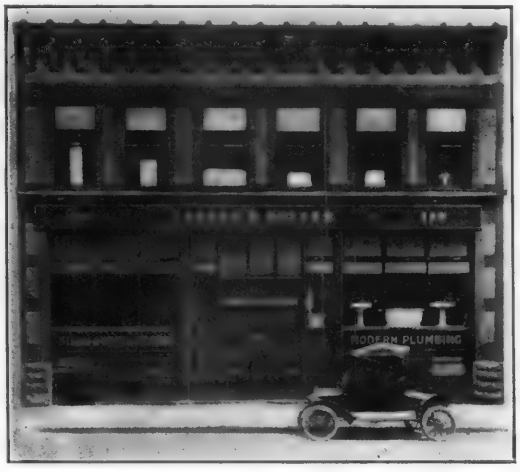
John Merringer, Paris, Ky., steam heating new warehouse building for Prichard & Ball at Paris.

Nichols & Apple, Brazil, Ind., heating and plumbing Spencer High School building for $38,000.

A. M. Michel, Mauston, Wis., heating and plumbing Academy building at Endeavor, Wis., for $7,000.

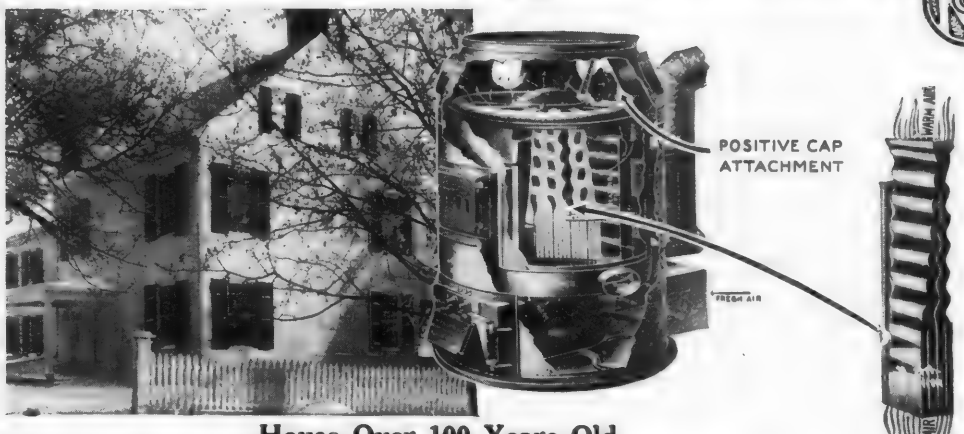
BUSINESS CHANGES.

Barnd & Geiger, heating and plumbing contractors, Buffalo, N. Y., are now located



NEW QUARTERS OF BARND & GEIGER, BUFFALO, N. Y.

in their new quarters at 299-301 Ellicott Street, where they occupy the entire building.



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We have a letter from its present owner, who is art editor of a prominent magazine. You will be interested in what he says about the Kelsey Warm Air Generators.

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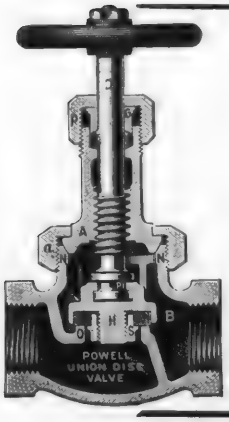

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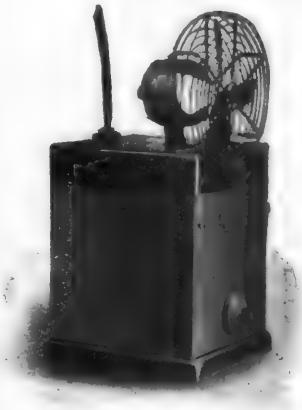

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HEATING SYSTEMS, AND THE DESIGN OF HOT WATER AND STEAM HEATING APPARATUS. By F. W. Raynes. A new English work, with large number of charts, and showing unique methods for sizing pipes of different systems. A book intended for the busy professional man, as well as for students. 328 pages. Size 6 x 9 in. Illustrated. Price, $3.50 postpaid.

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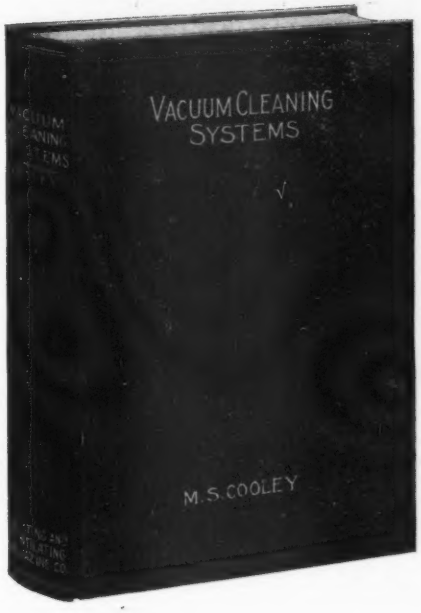

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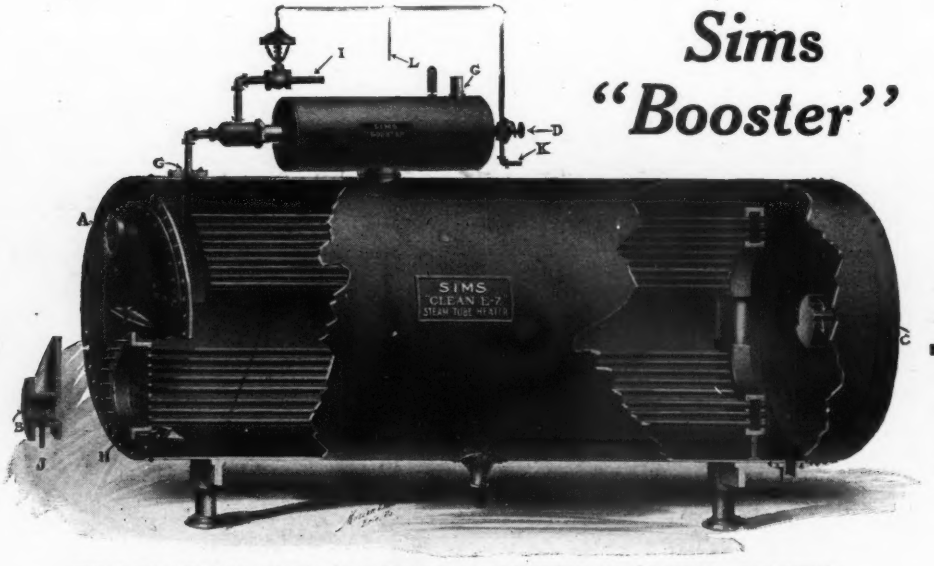

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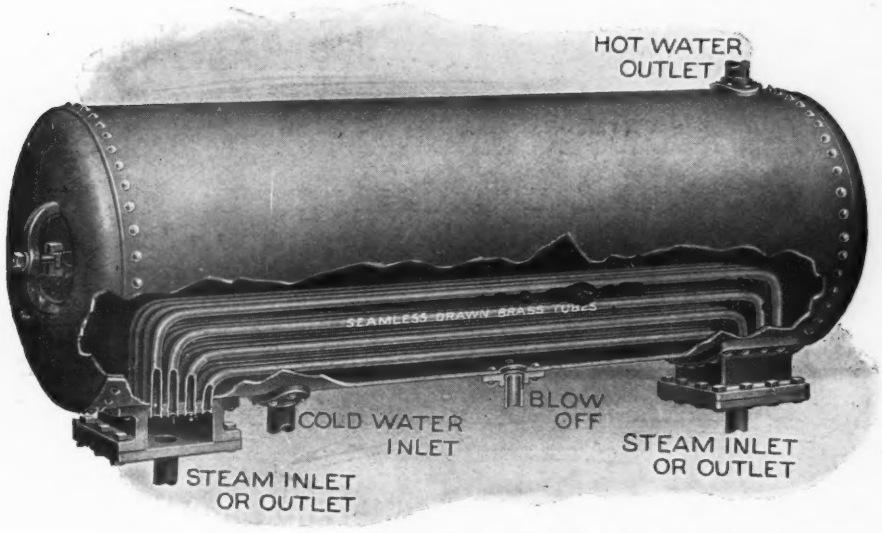

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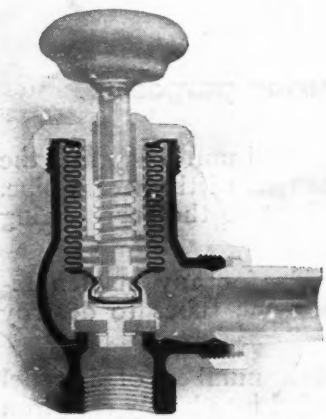
Sylphon no-leak insurance

The fact that Insurance Companies are writing insurance against the damage done by leaky radiator valves is sufficient evidence of the importance of providing against such occurrences. And after all, prevention is the best insurance. A fire-proof building costs more than an inflammable structure, and a leakless radiator valve costs more than a leaky one, but thousands and thousands of buyers are willing to *pay more* for them, because of the reduced cost of protection and the insurance against damage to valuable property.

Sylphon Packless Radiator Valves

are leakless. The black line in the illustration shows the unbroken metal wall (the Sylphon Brass Bellows) which makes leakage impossible. There is no opening, no moving point of contact between the chamber containing the stem and stem support and the body of the valve through which the steam and water passes. They simply cannot leak and the working parts are protected from the steam and wash of the system. There are no perishable parts, no packing to bind or stick—a child can turn them with the tips of the fingers. Sylphon Packless Radiator Valves are the best insurance against damage to expensive rugs, floors, walls and ceilings. They are to the heating contractor the best assurance of the lasting satisfaction of his customer.



The black lines show the unbroken metal wall which makes leakage impossible

AMERICAN RADIATOR COMPANY

Chicago, New York, Boston, Providence, Philadelphia, Baltimore, Buffalo, Rochester, Washington, Pittsburgh, Cleveland, Cincinnati, Detroit, Atlanta, Birmingham, New Orleans, Indianapolis, Milwaukee, Omaha, Minneapolis, St. Paul, St. Louis, Kansas City, Denver, San Francisco, Los Angeles, Portland, Seattle, Spokane, Brantford (Ont.), London, Brussels, Paris, Berlin, Cologne, Vienna, Milan